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SIDE-X™ TEST TOOL

User Guide – Win/Mac/Linux

Revision History

Date	Remarks	Version
08/30/2017	Initial draft	1.0
02/28/2018	Release updates with screenshots	1.1
03/28/2018	Applet load, Delete Applet feature updates	1.2
04/03/2018	Reformatting	1.3

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1 OVERVIEW

This document explains how to install and use the Side-X Test Tool on a Win/Mac/Linux platform. It is a piece of software which is used to load an applet into the SideCard and to communicate with the SideCard using Application Protocol Data Unit (APDU) commands. The application communicates with the SideCard via contact interface using ISO 7816 protocol. Requirements to run the Side-X Test Tool are defined below.

1.1 HARDWARE REQUIREMENTS

1. SideCard (which is pre-personalized)
2. Smart Card Reader
3. Desktop/Laptop System

1.2 SOFTWARE REQUIREMENTS

- Operating Systems
 1. Windows/Linux/macOS
- Software
 1. Java, JRE 1.6 onwards
 2. Smart Card Reader Driver

2 APDU COMMUNICATION

Application Protocol Data Unit command is a set of bytes. APDU communication involves sending a command APDU to the Firmware or Secure Element (SE) of a smart card, processing it, and receiving a response APDU. APDU commands are a queue of binary numbers of the following form:

Command APDU						
Header (required)				Body (optional)		
CLA	INS	P1	P2	Lc	Data Field	Le

The first four sections, i.e. *CLA*, *INS*, *P1* and *P2* are mandatory in all APDU commands and **each one has one-byte length**. These one-byte length sections stand for Class, Instruction, Parameter1 and Parameter2 respectively.

The last three sections, i.e. *Lc*, *Data Field (CData)*, and *Le* are optional. *Lc* represents the length of the *CData* field. *Le* specifies the maximum length of expected response data.

The **response APDU** is expected to contain response data with status words: SW1 SW2; which denote processing state in the smart card.

Response APDU		
Body (optional)	Trailer (required)	
Data Field	SW1	SW2

Different types of APDU commands:

Case 1:

No Command data,
No Response required

CLA	INS	P1	P2
-----	-----	----	----

Case 2:

No Command data,
Yes Response required

CLA	INS	P1	P2	Le
-----	-----	----	----	----

Case 3:

Yes Command data,
No Response required

CLA	INS	P1	P2	Lc	Data Field
-----	-----	----	----	----	------------

Case 4:

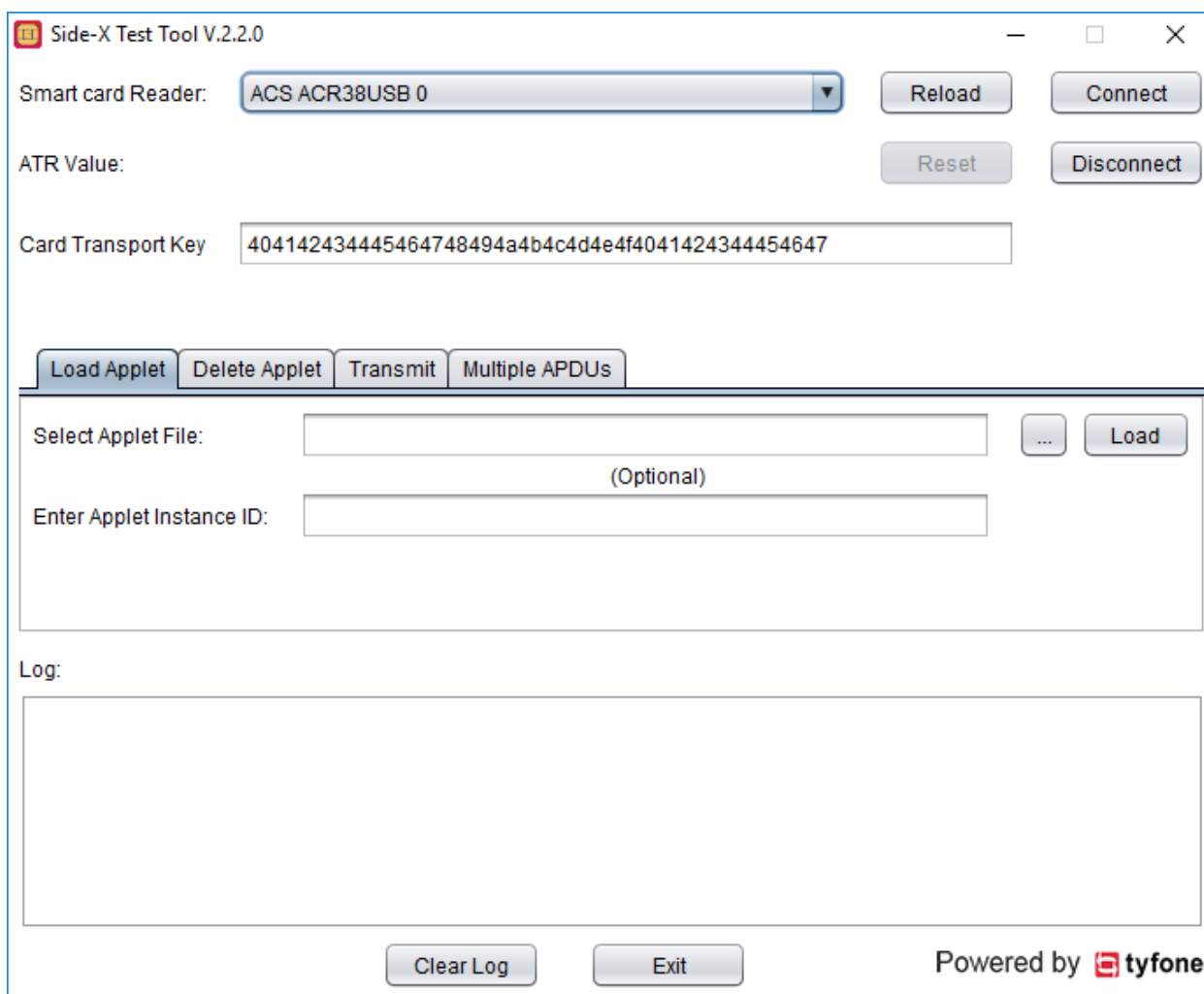
Yes Command data,
Yes Response required

CLA	INS	P1	P2	Lc	Data Field	Le
-----	-----	----	----	----	------------	----

3 RUNNING SIDE-X TEST TOOL

1. Connect smart card reader to the desktop/laptop system and make sure that the connected smart card reader is detected by the system/laptop. If not, please install appropriate smart card reader driver.
2. Insert SideCard into the smart card reader.
3. Open the Side-X Test Tool by double clicking on Side-X_TestTool_<X.Y.Z>.jar

NOTE: The 'Card Transport Key' field displays the default key value which is required to authenticate with SideCard.



Side-X Test Tool V.2.2.0

Smart card Reader: ACS ACR38USB 0 Reload Connect

ATR Value: Reset Disconnect

Card Transport Key 404142434445464748494a4b4c4d4e4f4041424344454647

Load Applet Delete Applet Transmit Multiple APDUs

Select Applet File: ... Load

(Optional)

Enter Applet Instance ID:

Log:

Clear Log Exit Powered by tyfone

4. If the smart card reader name is not loaded, please re-connect Smart Card Reader to the system's USB port and select 'Reload' button.
5. Choose the smart card reader and select 'Connect' button.
6. On successful connection, the SideCard's ATR (Answer To Reset) value is displayed.

Side-X Test Tool V.2.2.0

Smart card Reader:

ATR Value:

Card Transport Key


Select Applet File:

(Optional)

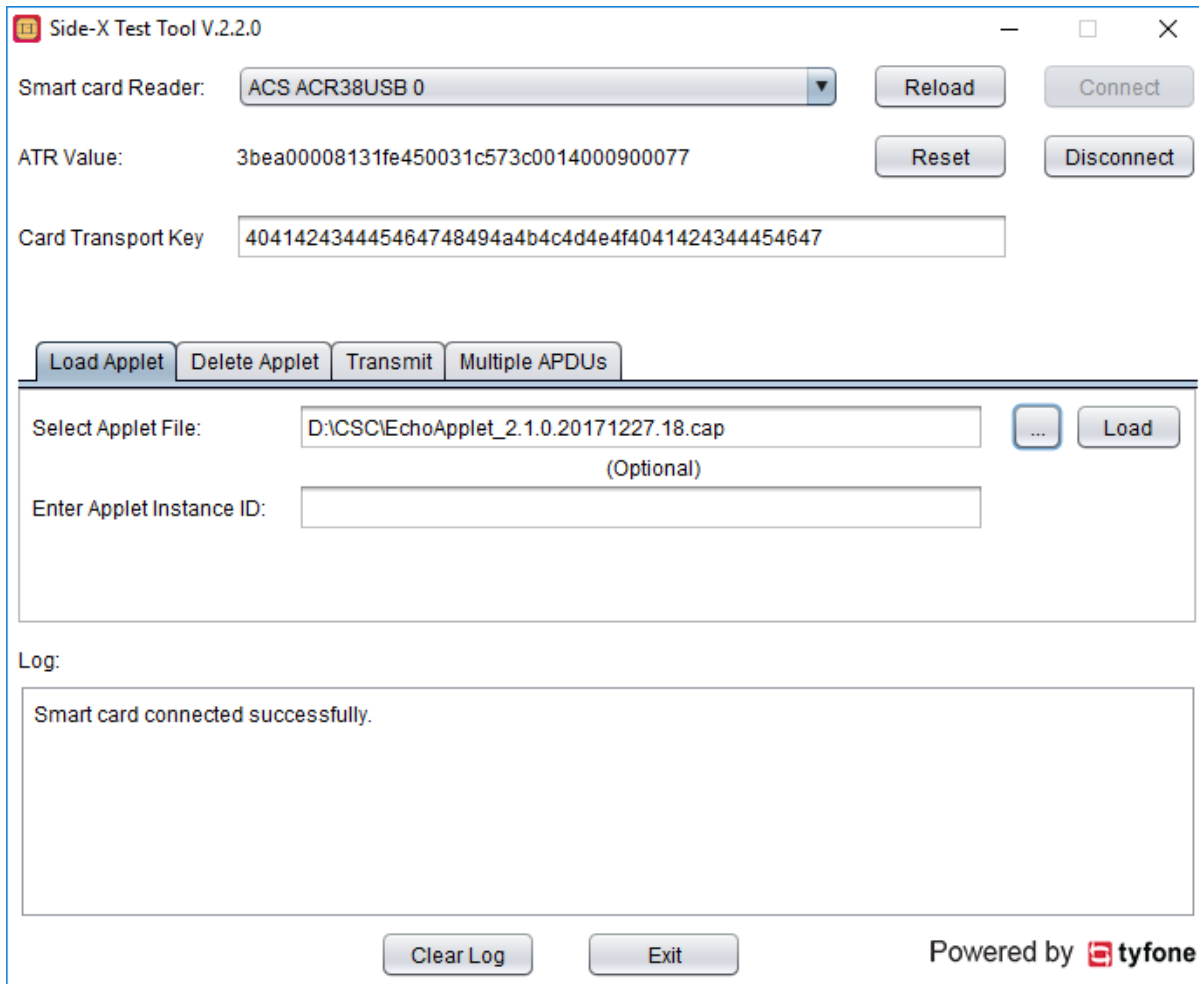
Enter Applet Instance ID:

Log:

Smart card connected successfully.

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3.1 LOADING AN APPLLET



The screenshot shows the Side-X Test Tool V.2.2.0 window. At the top, there's a title bar with standard window controls. Below it, the 'Smart card Reader' is set to 'ACS ACR38USB 0' with a dropdown arrow. To the right are 'Reload' and 'Connect' buttons. The 'ATR Value' is '3bea00008131fe450031c573c0014000900077' with 'Reset' and 'Disconnect' buttons. The 'Card Transport Key' is '404142434445464748494a4b4c4d4e4f4041424344454647'. Below these are four tabs: 'Load Applet' (selected), 'Delete Applet', 'Transmit', and 'Multiple APDUs'. In the 'Load Applet' tab, there's a 'Select Applet File' field with the path 'D:\CSC\EchoApplet_2.1.0.20171227.18.cap' and a file selection button '...' next to it. A 'Load' button is to the right. Below this is an '(Optional)' label and an 'Enter Applet Instance ID' field. At the bottom left is a 'Log' section with a text area showing 'Smart card connected successfully.' and a 'Clear Log' button. At the bottom right are 'Exit' and 'Powered by tyfone' buttons.

1. Select 'Load Applet' tab.
2. Choose the applet (*.cap) file by clicking on the '...' button. After selection of the applet file, optionally an instance ID for the applet can be provided.
3. Click on 'Load' button. If the operation is successful then 'Selected applet: xxx.cap loaded successfully.' message is shown in 'Log' section. Otherwise, an error message is displayed.

Side-X Test Tool V.2.2.0

Smart card Reader: ACS ACR38USB 0 Reload Connect

ATR Value: 3bea00008131fe450031c573c0014000900077 Reset Disconnect

Card Transport Key: 404142434445464748494a4b4c4d4e4f4041424344454647

Load Applet Delete Applet Transmit Multiple APDUs

Select Applet File: D:\CSC\EchoApplet_2.1.0.20171227.18.cap ... Load
(Optional)

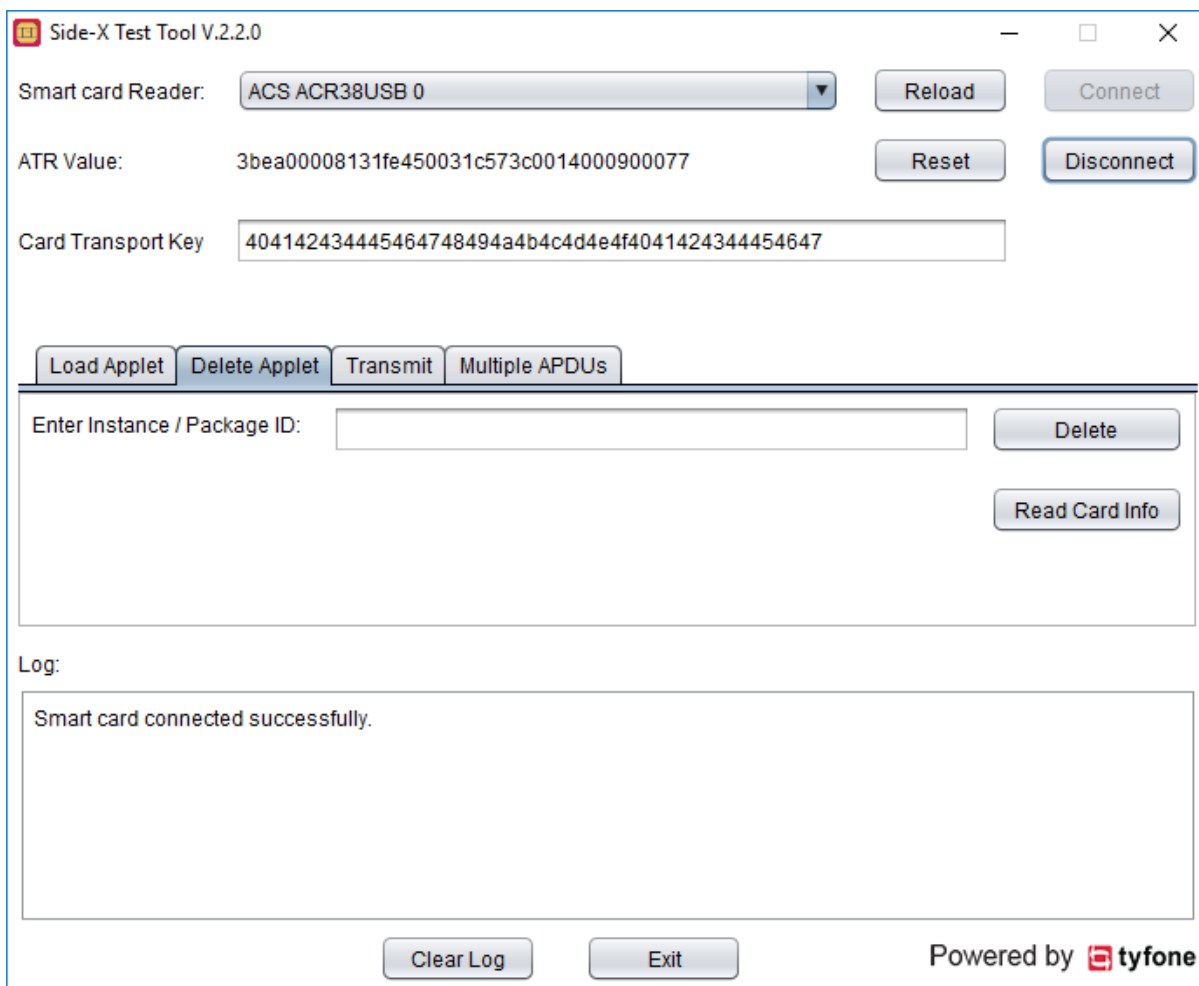
Enter Applet Instance ID:

Log:

```
Response    ==> 009000
APDU        ==> 80E880030c0906060d101909081b090823
Response    ==> 009000
APDU        ==>
80E60C002409a00000005742000010009a0000005742000010109a00000057420000101010002C90000
Response    ==> 009000
Selected applet: D:\CSC\EchoApplet_2.1.0.20171227.18.cap loaded successfully.
```

Clear Log Exit Powered by tyfone

3.2 DELETING AN APPLLET



The screenshot shows the Side-X Test Tool V.2.2.0 interface. At the top, there's a title bar with the application name and standard window controls. Below the title bar, there are several input fields and buttons. The 'Smart card Reader' field is set to 'ACS ACR38USB 0'. The 'ATR Value' field contains '3bea00008131fe450031c573c0014000900077'. The 'Card Transport Key' field contains '404142434445464748494a4b4c4d4e4f4041424344454647'. There are 'Reload', 'Connect', 'Reset', and 'Disconnect' buttons. Below these, there are four tabs: 'Load Applet', 'Delete Applet' (which is selected), 'Transmit', and 'Multiple APDUs'. In the 'Delete Applet' tab, there is a text field labeled 'Enter Instance / Package ID:' and a 'Delete' button. Below this, there is a 'Read Card Info' button. At the bottom, there is a 'Log' section with a text area showing 'Smart card connected successfully.' and 'Clear Log' and 'Exit' buttons. The bottom right corner says 'Powered by tyfone'.

1. Select 'Delete Applet' tab.
2. Click on 'Read Card Info' button to display list of Package IDs and Applet AIDs available in the Smart Card.
3. Enter Instance ID or Package ID of the desired applet in the 'Enter Instance/Package ID' text field and click on 'Delete' button to delete the applet from the Smart Card.

Side-X Test Tool V.2.2.0

Smart card Reader: ACS ACR38USB 0 Reload Connect

ATR Value: 3bea00008131fe450031c573c0014000900077 Reset Disconnect

Card Transport Key: 404142434445464748494a4b4c4d4e4f4041424344454647


Load Applet Delete Applet Transmit Multiple APDUs

Enter Instance / Package ID: Delete

Read Card Info

Log:

```
07a000000151535001000108a00000015153504109a0000005742000010001000109a000000574200001019000
Package IDs:...
    a0000001515350
    a00000057420000100
Instance IDs:...
    a00000057420000101
```

Clear Log Exit Powered by  tyfone

Side-X Test Tool V.2.2.0

Smart card Reader: ACS ACR38USB 0 Reload Connect

ATR Value: 3bea00008131fe450031c573c0014000900077 Reset Disconnect

Card Transport Key: 404142434445464748494a4b4c4d4e4f4041424344454647

Load Applet Delete Applet Transmit Multiple APDUs

Enter Instance / Package ID: a00000057420000100 Delete

Read Card Info


Log:

Card manager authenticated successfully.

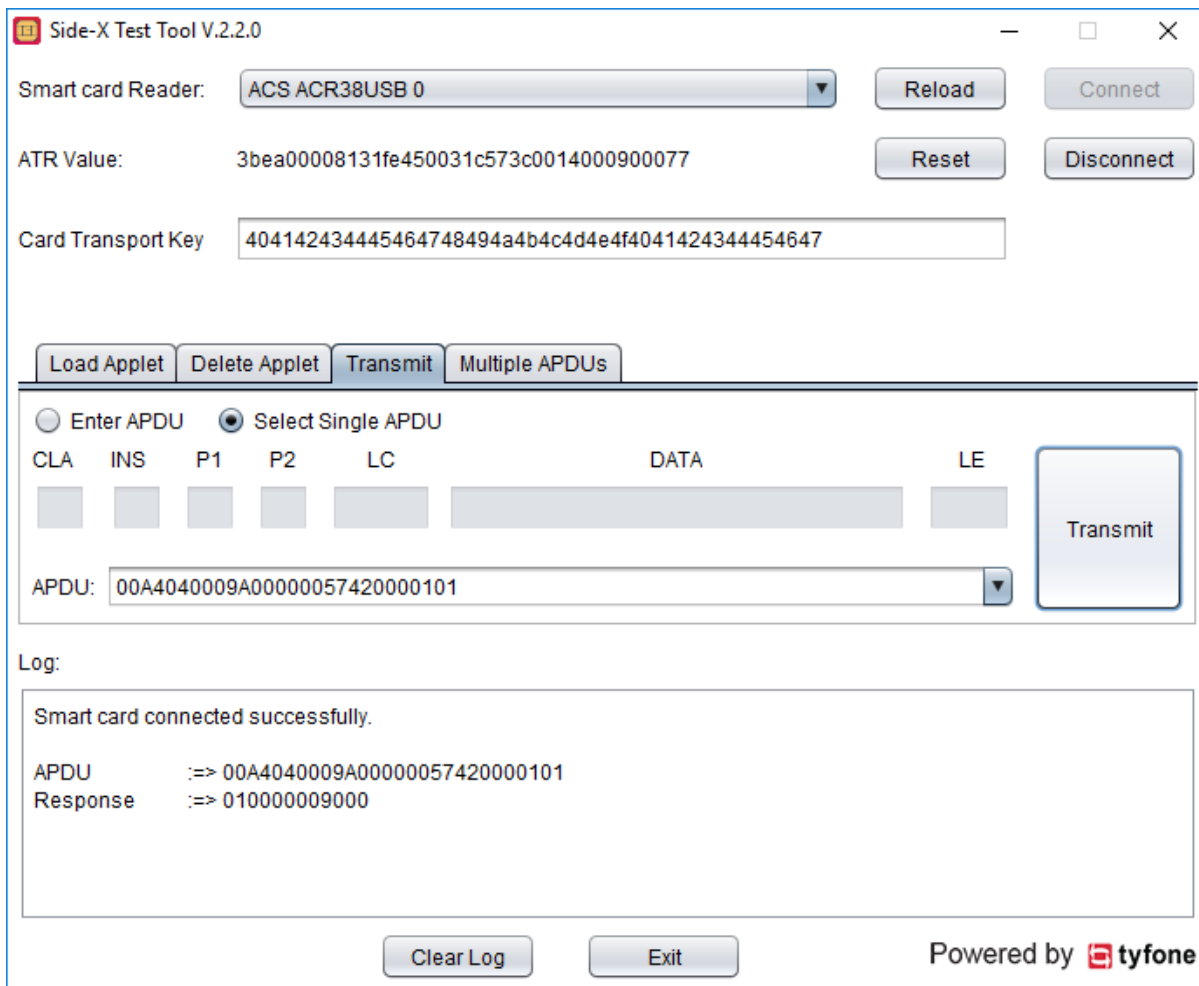
APDU => 80E400800b4F09a00000057420000100

Response => 009000

Selected applet deleted successfully.

Clear Log Exit Powered by  tyfone

3.3 TRANSMIT SINGLE APDU



Side-X Test Tool V.2.2.0

Smart card Reader: ACS ACR38USB 0 Reload Connect

ATR Value: 3bea00008131fe450031c573c0014000900077 Reset Disconnect

Card Transport Key: 404142434445464748494a4b4c4d4e4f4041424344454647

Load Applet Delete Applet Transmit Multiple APDUs

☐ Enter APDU ☒ Select Single APDU

CLA	INS	P1	P2	LC	DATA	LE

APDU: 00A4040009A00000057420000101 Transmit

Log:

```
Smart card connected successfully.

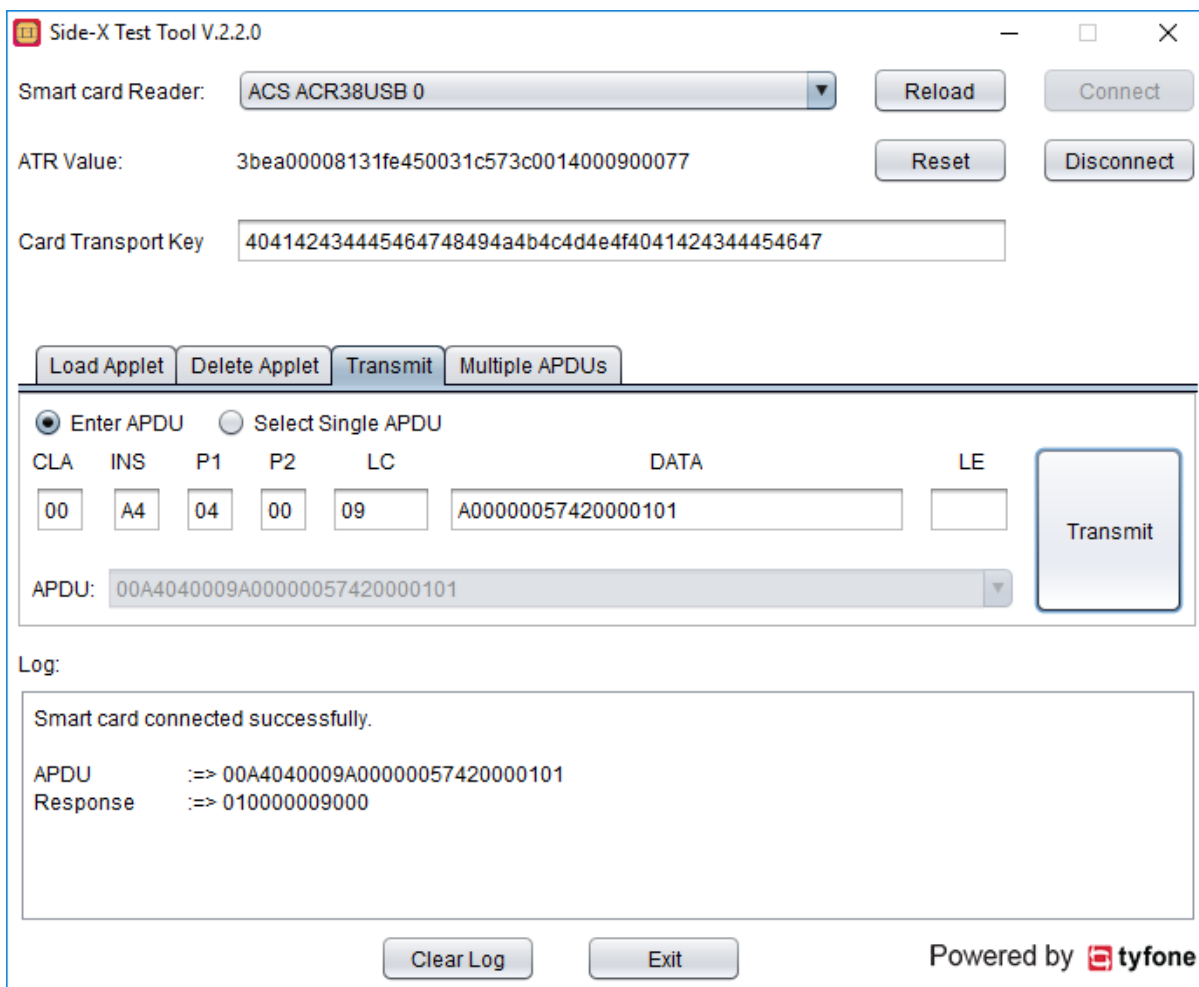
APDU      :=> 00A4040009A00000057420000101
Response  :=> 010000009000
```

Clear Log Exit Powered by tyfone

3.3.1 Using 'Select Single APDU' Option

1. Select 'Transmit' tab.
2. Choose 'Select Single APDU' (default) radio button.
3. Select APDU from drop down list, or enter an APDU command in 'APDU' field.
4. Click on 'Transmit' button to send the APDU command to the smart card and read the response.
5. APDU command and its response data along with status bytes is displayed in the 'Log' section.

3.3.2 Using ‘Enter APDU’ Option



Side-X Test Tool V.2.2.0

Smart card Reader: ACS ACR38USB 0 Reload Connect

ATR Value: 3bea00008131fe450031c573c0014000900077 Reset Disconnect

Card Transport Key: 404142434445464748494a4b4c4d4e4f4041424344454647

Load Applet Delete Applet Transmit Multiple APDUs

☒ Enter APDU ☐ Select Single APDU

CLA	INS	P1	P2	LC	DATA	LE
00	A4	04	00	09	A00000057420000101	

APDU: 00A4040009A00000057420000101 Transmit

Log:

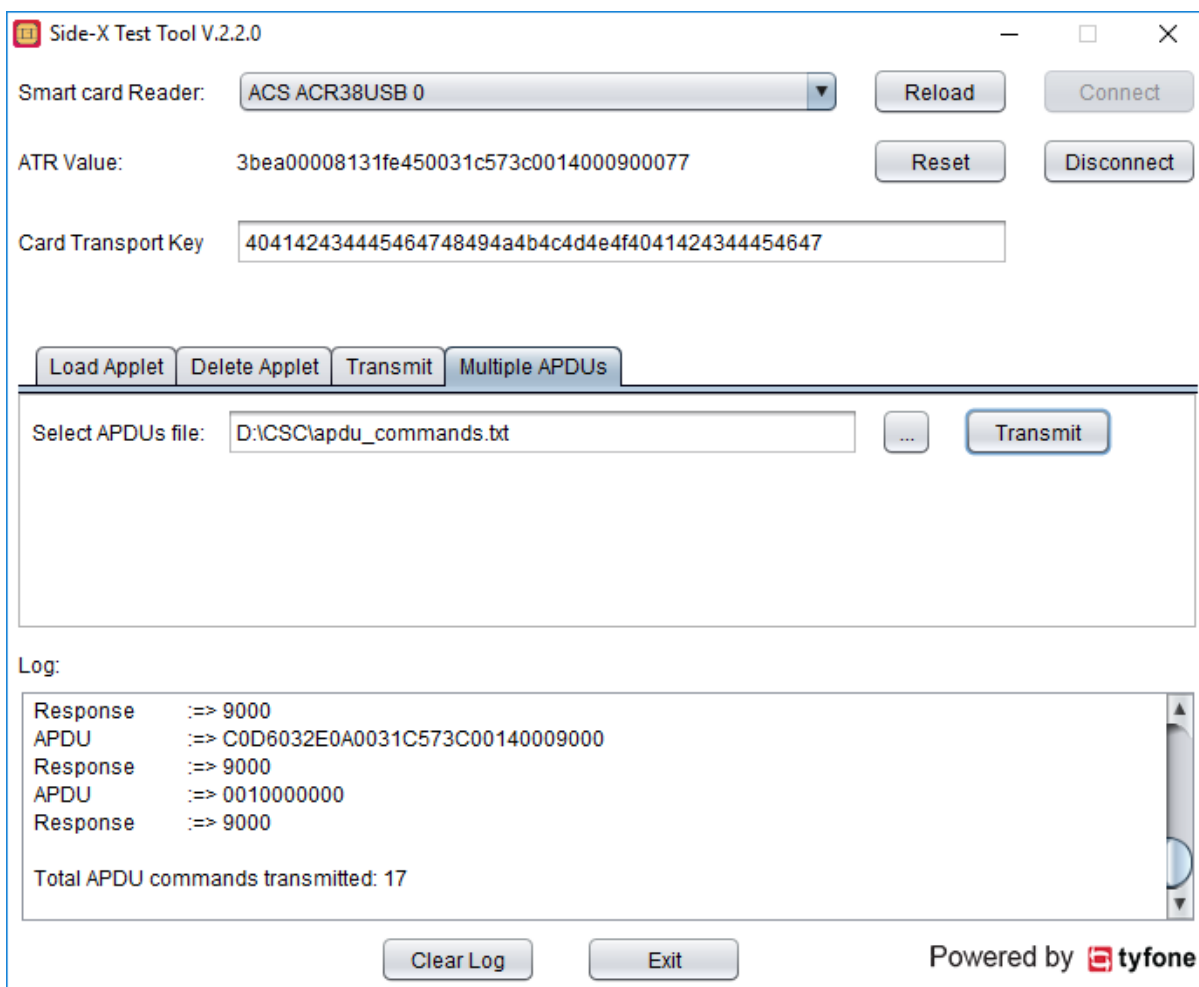
```
Smart card connected successfully.

APDU      :=> 00A4040009A00000057420000101
Response   :=> 0100000009000
```

Clear Log Exit Powered by tyfone

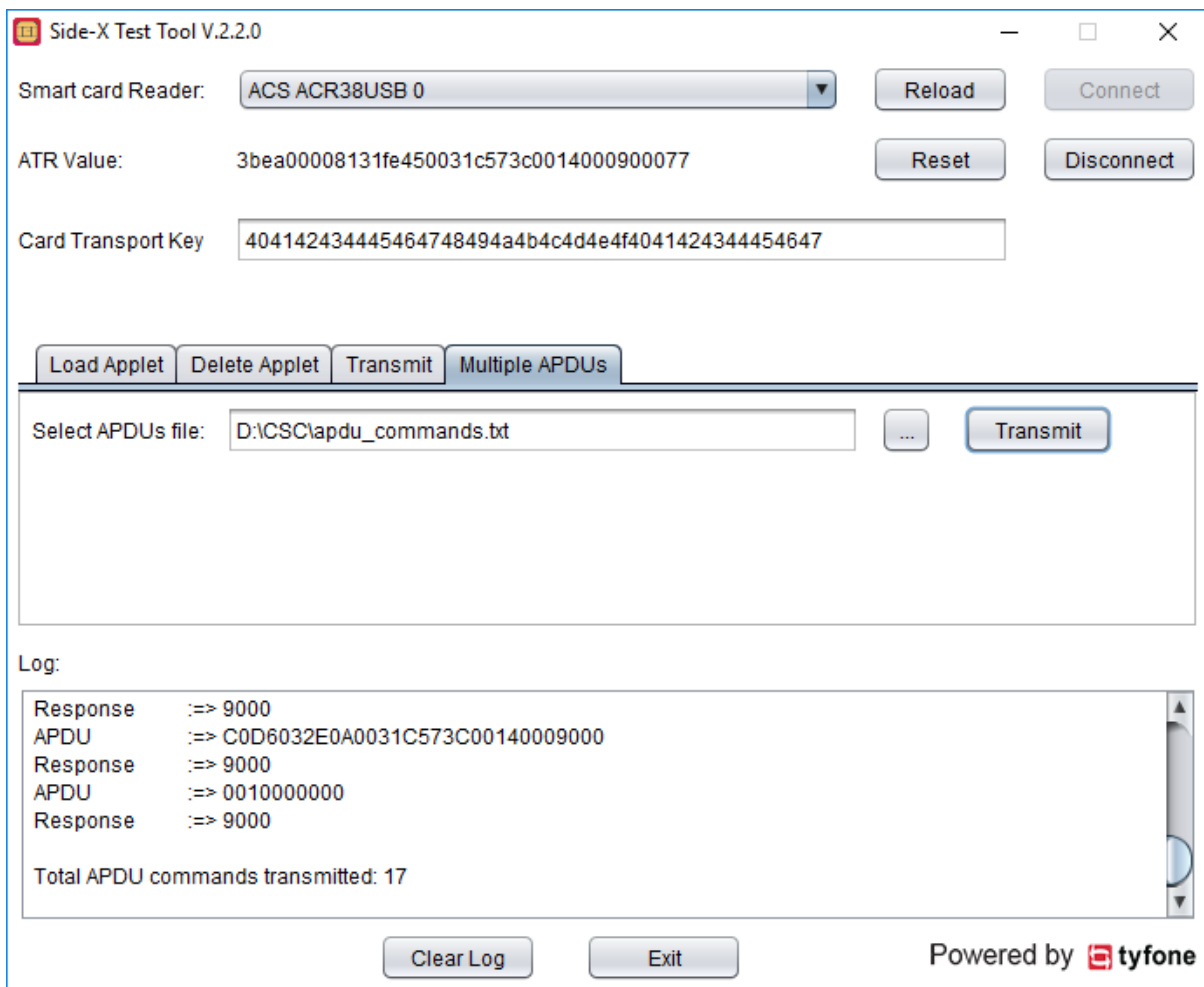
1. Select ‘Transmit’ tab.
2. Choose ‘Enter APDU’ radio button.
3. Enter APDU command in the APDU command parameter fields.
4. Click on ‘Transmit’ button to send the APDU command to smart card and read the response.
5. APDU command and its response data along with status bytes is displayed in the ‘Log’ section.

3.4 TRANSMIT MULTIPLE APDUS



The screenshot shows the Side-X Test Tool V.2.2.0 interface. At the top, there's a title bar with the application name and standard window controls. Below the title bar, there are several input fields and buttons. The 'Smart card Reader' field is set to 'ACS ACR38USB 0', with 'Reload' and 'Connect' buttons to its right. The 'ATR Value' field contains '3bea00008131fe450031c573c0014000900077', with 'Reset' and 'Disconnect' buttons to its right. The 'Card Transport Key' field contains '404142434445464748494a4b4c4d4e4f4041424344454647'. Below these fields, there are four tabs: 'Load Applet', 'Delete Applet', 'Transmit', and 'Multiple APDUs'. The 'Multiple APDUs' tab is selected. Under this tab, there's a 'Select APDUs file:' label, a text field containing 'D:\CSC\apdu_commands.txt', an ellipsis button, and a 'Transmit' button. At the bottom of the window, there's a 'Log' section with a text area displaying the following content: 'Response :=> 9000', 'APDU :=> C0D6032E0A0031C573C00140009000', 'Response :=> 9000', 'APDU :=> 0010000000', 'Response :=> 9000', and 'Total APDU commands transmitted: 17'. Below the log, there are 'Clear Log' and 'Exit' buttons. In the bottom right corner, it says 'Powered by tyfone'.

1. Select 'Multiple APDUs' tab.
2. Select the multiple APDUs text file by clicking on '...' button.
NOTE: In the text file, any lines that start with '/' or '#' will be ignored.
3. Click on 'Transmit' button. All the APDU commands listed in the text file are sent to the smart card and the corresponding responses are also read. The 'Log' section will display all the command/response messages along with a total count of APDU commands transmitted.



Side-X Test Tool V.2.2.0

Smart card Reader: ACS ACR38USB 0 Reload Connect

ATR Value: 3bea00008131fe450031c573c0014000900077 Reset Disconnect

Card Transport Key 404142434445464748494a4b4c4d4e4f4041424344454647

Load Applet Delete Applet Transmit Multiple APDUs

Select APDUs file: D:\CSC\apdu_commands.txt ... Transmit

Log:

Response :=> 9000
APDU :=> C0D6032E0A0031C573C00140009000
Response :=> 9000
APDU :=> 0010000000
Response :=> 9000

Total APDU commands transmitted: 17

Clear Log Exit Powered by tyfone

NOTE: Please refer to Applet Specification document to form the list of APDUs

4 SIDECARD COMMUNICATION APPLICATION DEVELOPMENT

We use PCSC Smart Card communication APIs to communicate with our SideCard.

4.1 PCSC Sample Code in JAVA (WINDOWS/LINUX/MAC OS)

```
import java.util.List;

import javax.smartcardio.*;

public class Blog {

    public static void main(String[] args) {

        try {

            // Display the list of terminals

            TerminalFactory factory = TerminalFactory.getDefault();

            List<CardTerminal> terminals = factory.terminals().list();

            System.out.println("Terminals: " + terminals);

            // Use the first terminal

            CardTerminal terminal = terminals.get(0);

            // Connect with the card

            Card card = terminal.connect("");

            System.out.println("card: " + card);

            CardChannel channel = card.getBasicChannel();

            // Send Select Applet command

            byte[] aid = {(byte)0xA0, 0x00, 0x00, 0x00, 0x62, 0x03, 0x01, 0x0C, 0x06, 0x01};

            ResponseAPDU answer = channel.transmit(new CommandAPDU(0x00, 0xA4, 0x04, 0x00, aid));

            System.out.println("answer: " + answer.toString());
```

```
// Send test command

answer = channel.transmit(new CommandAPDU(0x00, 0x00, 0x00, 0x00));

System.out.println("answer: " + answer.toString());

byte r[] = answer.getData();

for (int i=0; i<r.length; i++)

    System.out.print((char)r[i]);

System.out.println();


// Disconnect the card

card.disconnect(false);

} catch(Exception e) {

    System.out.println("Ouch: " + e.toString());

}

}

}
```

4.2 OUTPUT

```
Terminals: [PC/SC terminal Gemplus GemPC Twin 00 00]

card: PC/SC card in Gemplus GemPC Twin 00 00, protocol T=1, state OK

answer: ResponseAPDU: 2 bytes, SW=9000

answer: ResponseAPDU: 14 bytes, SW=9000

Hello world!
```