Advanced Card Systems Ltd.
Card & Reader Technologies

ACR38 CCID Smart Card Reader

SDK User Reference Manual

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1.0. Introduction

Due to the rising demand of e-working methods (remote office, home office...) and the increasing risk of unauthorized access to private network, it is time to properly secure access to PCs, desktops, and the Intranet and Extranet networks. The ACR38 CCID series offers solutions based on smart card technology for such applications.

The ACR38 CCID is a smart card reader/writer is a USB full speed device, which is the interface for the communication between a computer and a smart card. It is designed for the PC environment and is the ultimate smart card peripheral for a PC.

Smart cards are becoming an essential component in network security and electronic payment system and the ACR38 CCID is the ideal partner when using a PC. It provides secured network computing environment with its data encryption function. Furthermore, with the SDK package, it will allow users to easily develop their own application to best meet the specific system needs.

The ACR38 CCID Smart Card Reader is a low cost, yet reliable and effective smart card-to-PC interface with design focusing on convenient use and harmony with other PC peripherals in shape and color. It also provides the solution where the security of a smart card is required. It can be used as access control to a computer or network (intranet, extranet, etc), authentication for e- commerce (B to B, B to C), etc. It is also very simple to use and install since it is CCID compliant and it can be support a wide variety of MCU and Memory cards. It is ideal for electronic commerce, home banking or e-purse facilities, secure computer access or any of a multitude of other applications.

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2.0. Features

- Conforms to: EN 60950/IEC 60950, ISO-7816, PC/SC, CCID, CE, FCC, Microsoft WHQL, EMV 2000 Level 1, FIPS 201
- Supports ISO-7816 Class A, B and C (5V, 3V, 1.8V) cards
- Read and write support to all microprocessor cards with T=0 or T=1 protocols
- Supports memory-based smart cards, including I2C bus protocol cards (from 1k bits up to 1024k bits) and Secure memory cards (Atmel AT88SC153 and AT88SC1608) and Memory Card with Security Logic (AT88SC101/102/1003)
- Supports SLE 4404/06/18/28/32/36/42, SLE 5518/28/32/36/42, SLE6636 memory cards
- Support PPS (Protocol and Parameters Selection) with 1,953 – 344,086 bps in reading and writing smart cards
- USB full speed interface to PC
- Short Circuit Protection
- RoHS Compliant

3.0. Technical Specifications

3.1. ACR38 CCID

Interface	USB full speed
Supply Voltage	Regulated 5V DC
Supply Current	max. 50mA
Operating Temperature	0 - 50 °C
CLK Frequency	4 MHz
Standards / Certifications	EN 60950/IEC 60950, ISO-7816, PC/SC, CCID, CE, FCC, EMV 2000 Level 1, FIPS 201, Microsoft WHQL
Device Driver Operating System Support	Windows 98, ME, 2000, XP, 2003, Vista

3.2. ACR38 CCID SDK CD-ROM

SDK CD-ROM Components:	Sample Codes • Delphi • Visual C# • VB .NET • Visual Basic • Visual C++ • Visual C++ (x64) • Java Sample Applications • Casino Application • School Application Tools and Utilities • Card Tool • PC/SC Learning Tool • Quick View • Scripting Tool Reference Manuals
SDK Operating System Support:	Windows ® (x86/x64) 2000, XP, Vista

4.0. Typical Applications

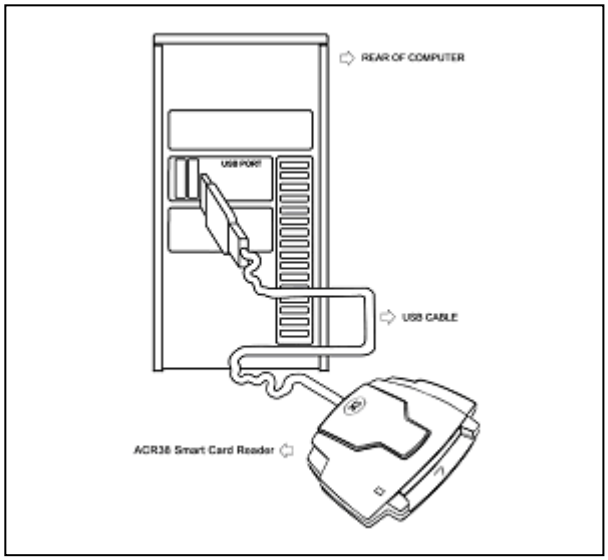
- Home Banking and Home Shopping
- Electronic Commerce
- Checking the balance of account of re-loading an electronic purses
- Network access control
- S/W locking
- Digital signature
- Loyalty and promotions
- Stored value
- Identification
- Ticketing
- Parking and toll collection
- Online gaming

5.0. Installation

5.1. Connection Diagram

Note: You can connect the ACR38 CCID Smart Card Reader/Writer device to your PC anytime AFTER the drivers have been loaded.

To connect the ACR38 CCID to your PC, plug in the USB connector (Type A) into available USB port.



5.2. Drivers Installation

Insert the ACR38 CCID SDK CDROM into your CDROM drive. If the screen below does not appear, run **x:\SETUrP.EXE** where **x** is the drive letter of your CDROM.

5.2.1. Introduction to ACS CCID Driver

This driver is based on Microsoft-initiated PC/SC standard specifications. In addition to the built-in implementation in Windows 2000/XP/2003/Vista, the PC/SC platform is also adopted as foundation layer for other smart card technologies such as the OCF and MUSCLE. This is the platform of choice if the application is designed to run on any PC/SC-compliant reader however, the PC/SC specification officially supports MCU cards only. Memory cards are supported by the ACR38 using pseudo-APDUs which can be found in the **ACR38 CCID Smart Card Reader Application Note: Memory Card Access** document.

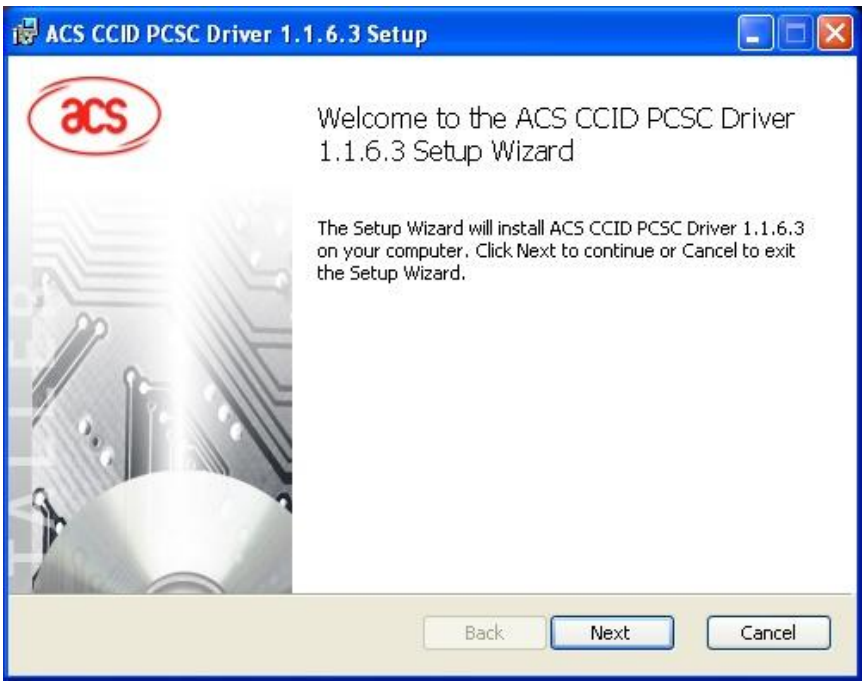
5.2.1.1. Windows 2000/XP/2003/Vista Manual Driver Installation

1. Click on **"Install Smart Card Reader Driver"** from the ACR38 CCID SDK Setup GUI and follow the instructions below.

2. Select the language of your choice and then click **OK**

3. Please wait while the Windows Installer prepares the installation.

4. Click **Next** to continue with the installation

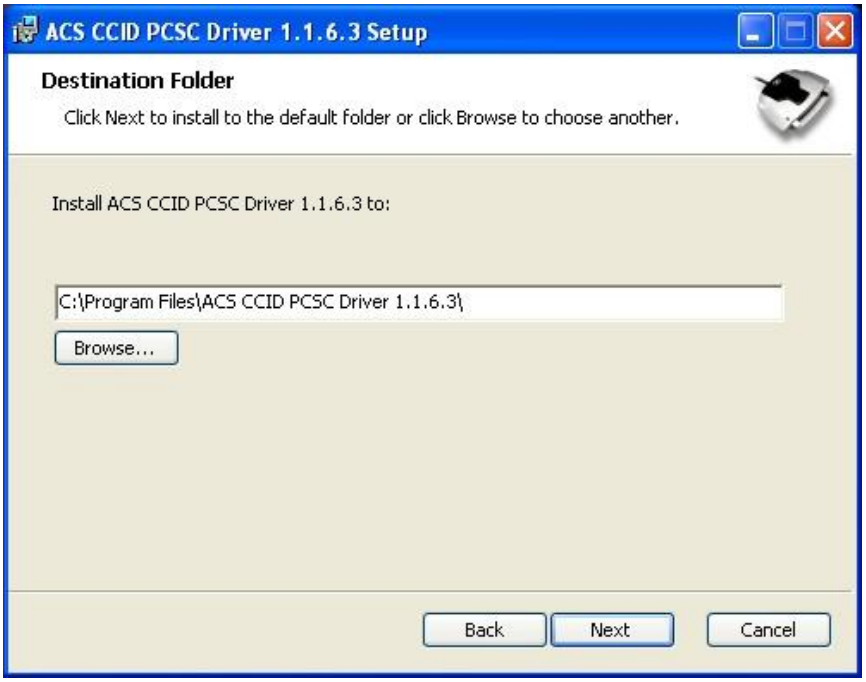


5. Choose Destination Location

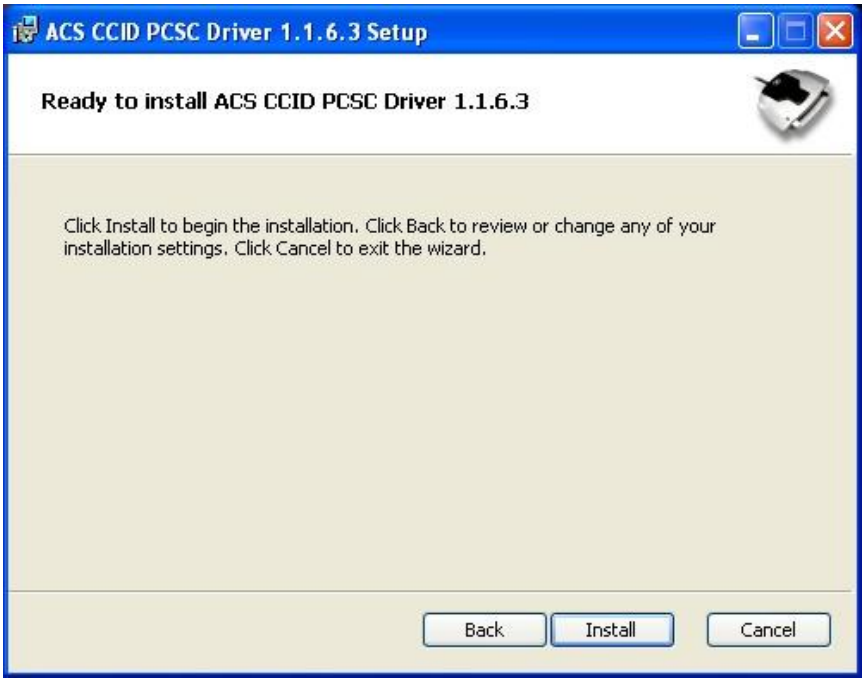
Setup will install ACS CCID PCSC driver in the following folder x:\Program Files\ACS CCID PCSC Driver 1.1.6.3\ where x is the drive letter of your local Windows drive.

To install to this folder, click **Next**.

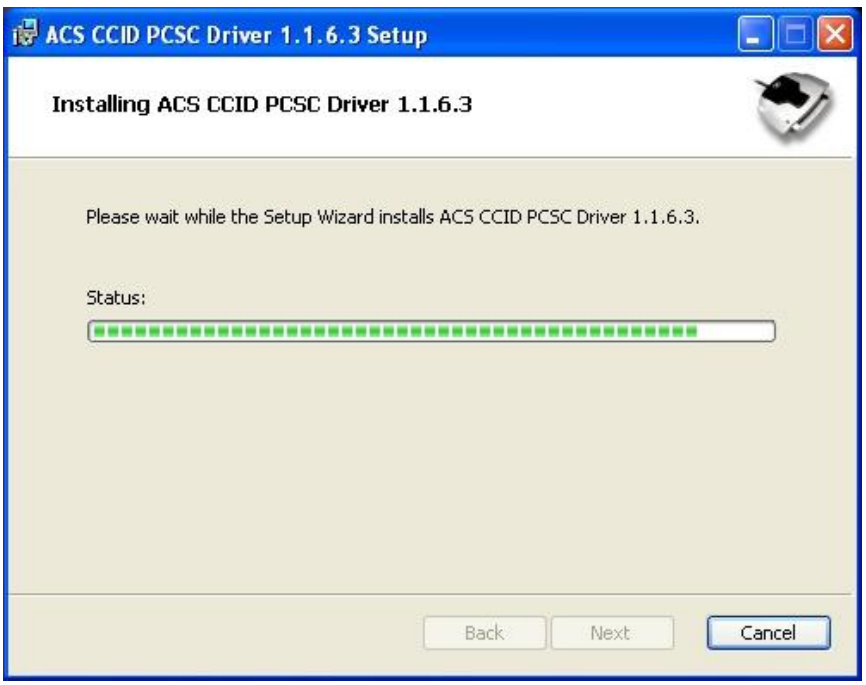
To install to a different folder, click **Browse** and select another folder then click **Next**.



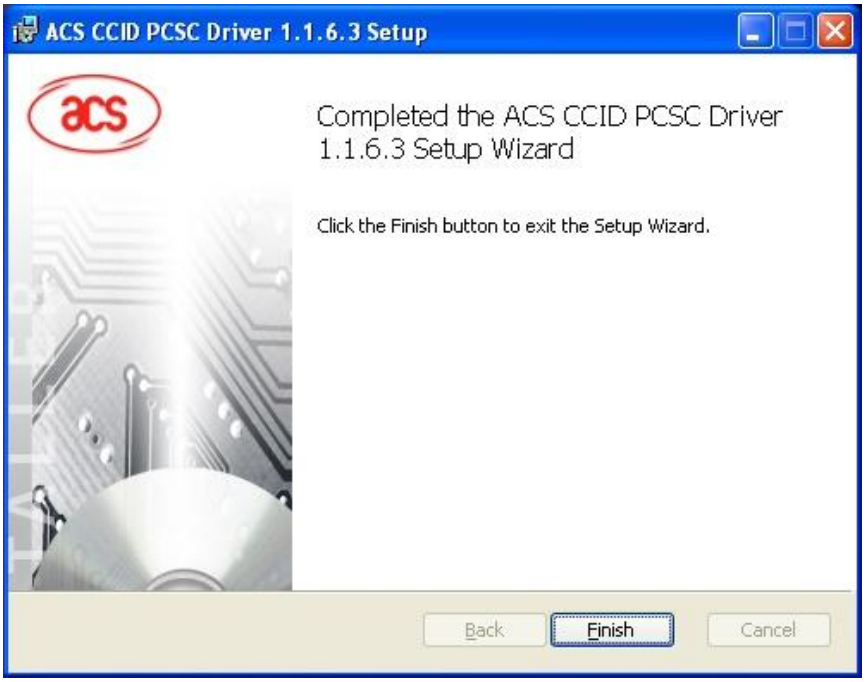
6. Click **Install**



7. Wait for the Setup to be completed



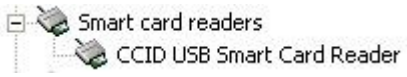
8. Please plug in the reader then click on **Finish** to exit program



9. To check whether you have successfully installed the drivers, go to:

Start → Settings → Control Panel → System → Hardware → Device Manager

The Windows Device Manager should list the CCID USB Smart Card Reader device under the Smart card readers' device type.



6.0. Let Windows Download the Driver for You

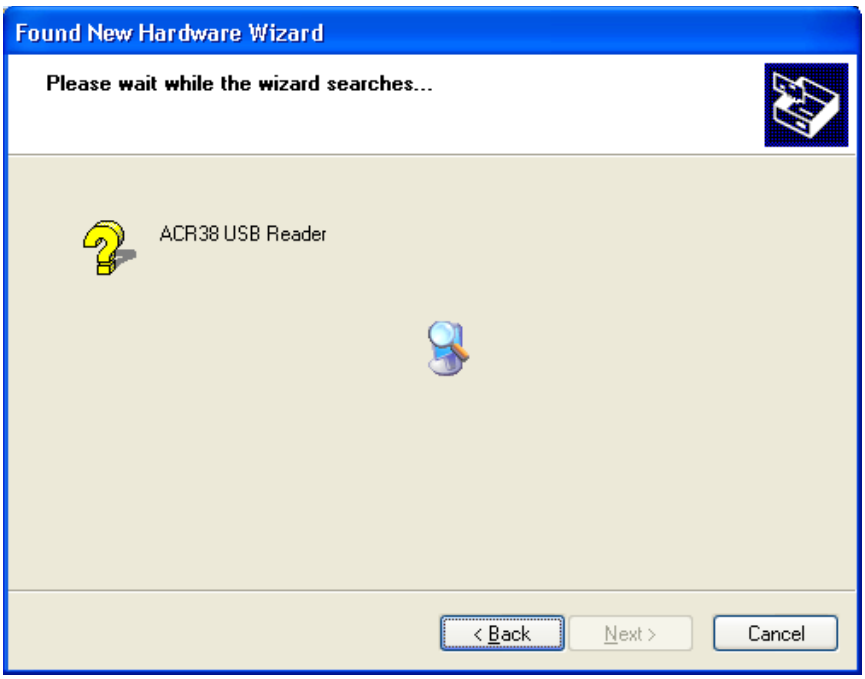
Users of Windows XP or higher may rely on Windows to download and install the drivers. All that is required is Internet access then plug in the reader and tell the Windows Hardware Installation Wizard to go and download the drivers instead of looking for them on a CDROM or the local Windows system directories.

1. If you are using Windows XP with Service Pack 2 and the Windows Update is set to notify user every time a new device is connected, the window on the right will appear.

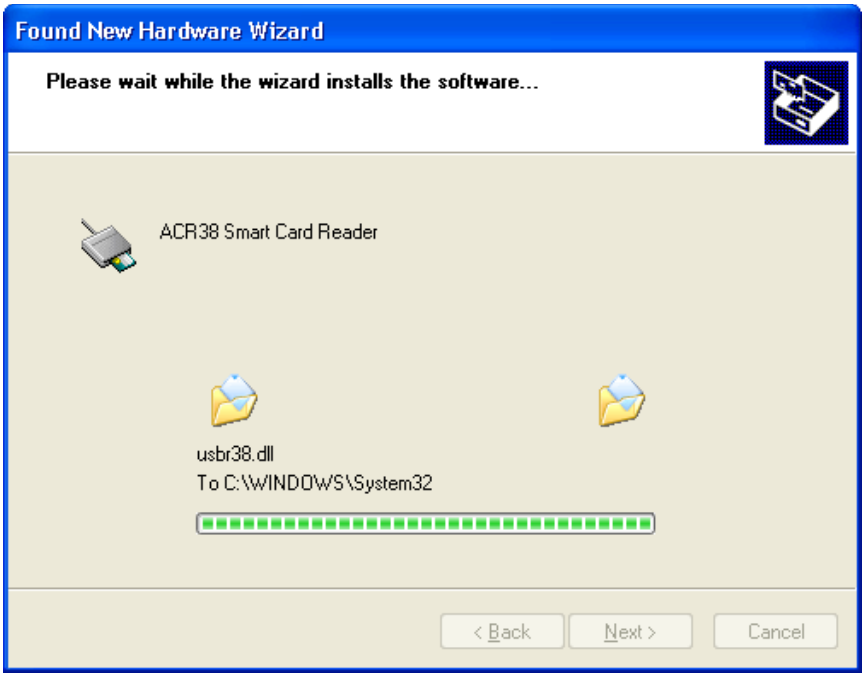
Else, proceed to step 2.

2. In the Found New Hardware Wizard window, leave the “Install the software automatically (Recommended)” option selected then click “Next >”.

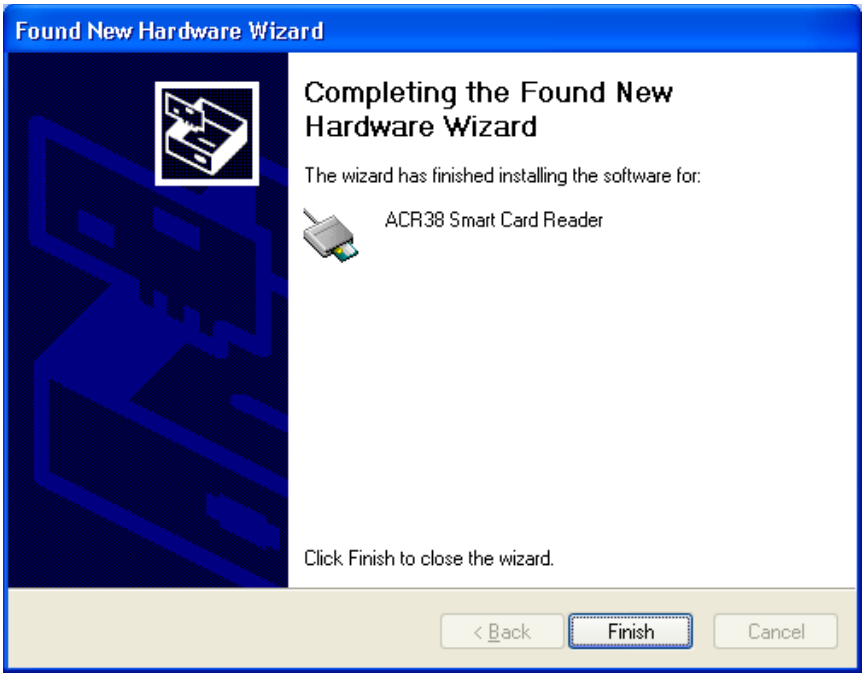
3. Let Windows search the driver on the Internet.



4. Please wait while the wizard installs the driver.



5. Click **"Finish"** to complete the installation.

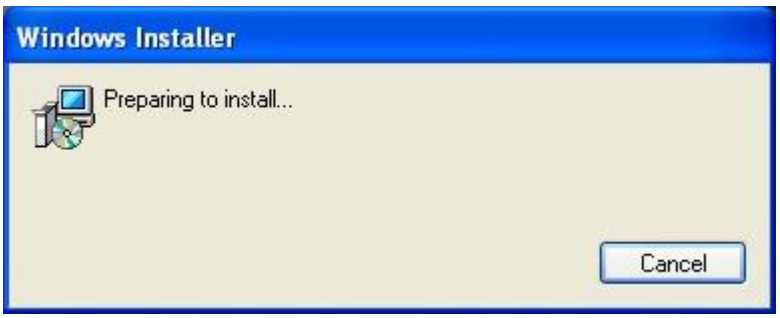


7.0. Drivers Uninstallation

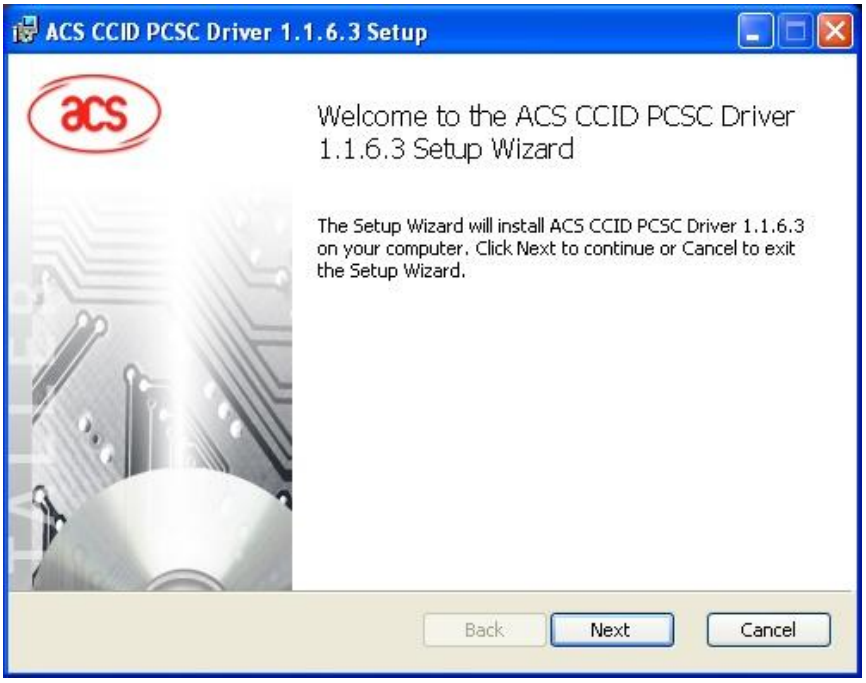
1. Click on **"Install Smart Card Reader Driver"** from the ACR38 CCID SDK Setup GUI and follow the instructions below.

2. Select the language of your choice and then click **OK**

3. Please wait while the Windows Installer prepares the installation.



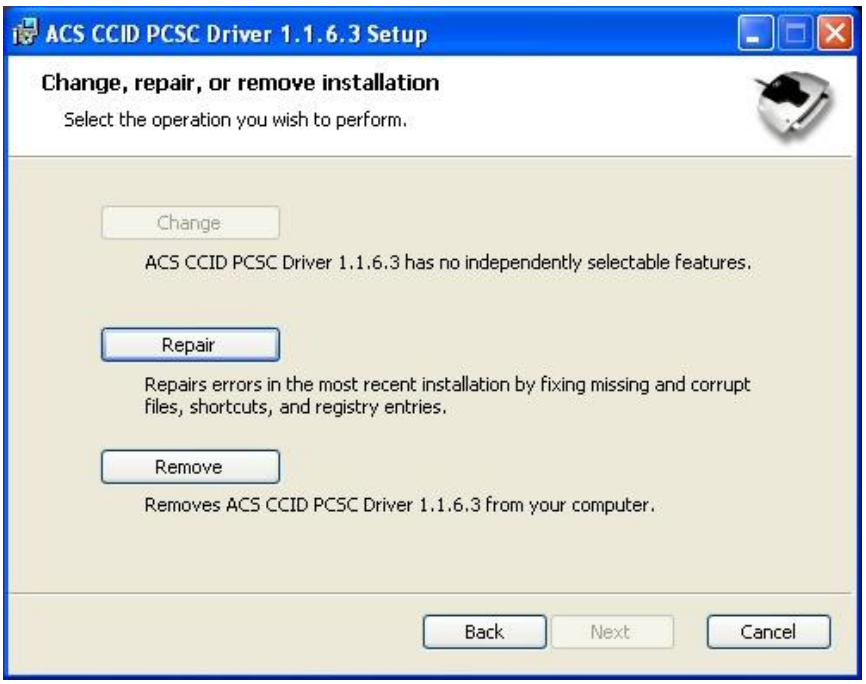
4. Click **Next** to continue with the installation



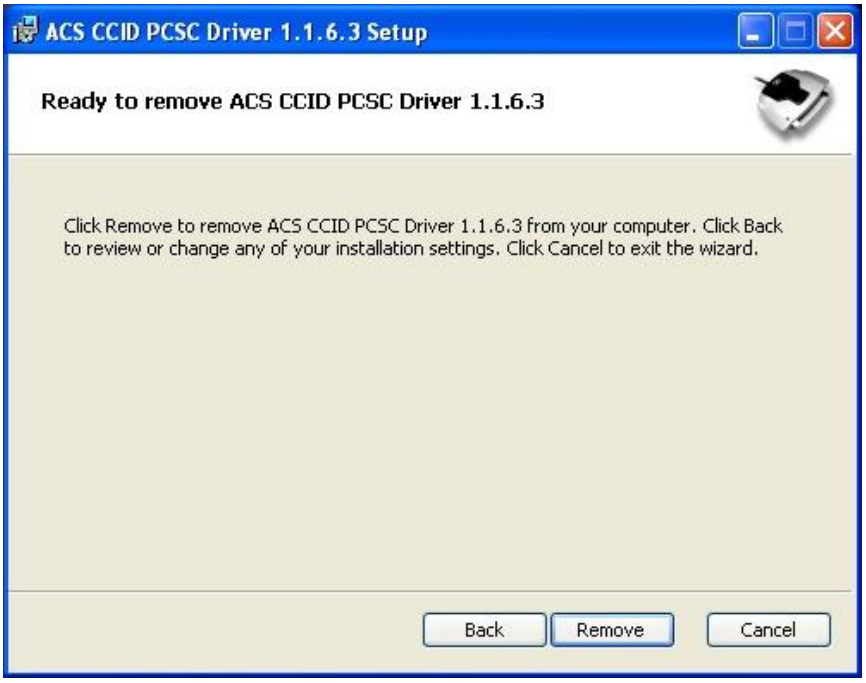
5. Change, repair, or remove installation

Select **Repair** in case you encounter any problem while using the ACR38 CCID reader

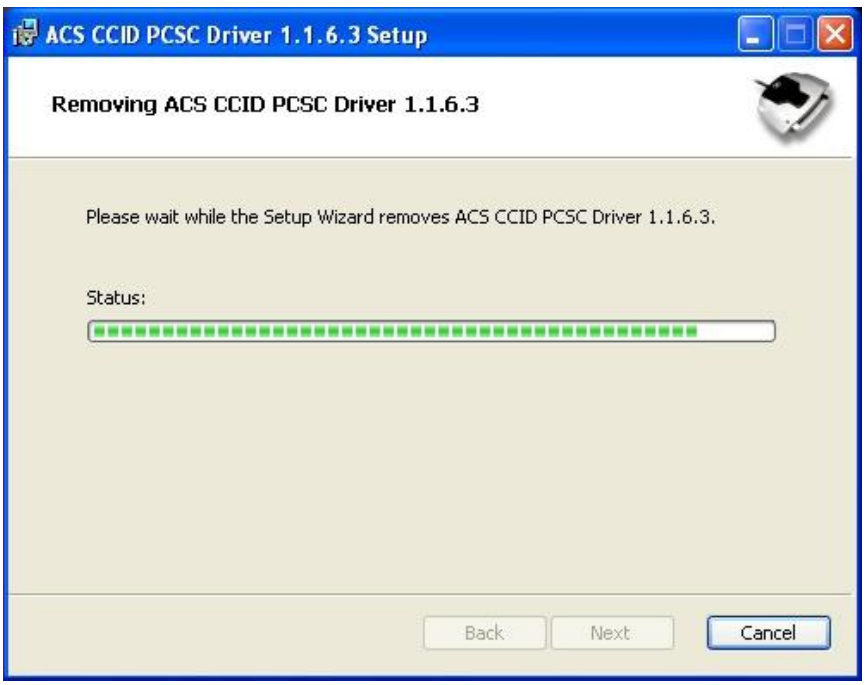
To completely remove smart card reader driver click on **Remove** button



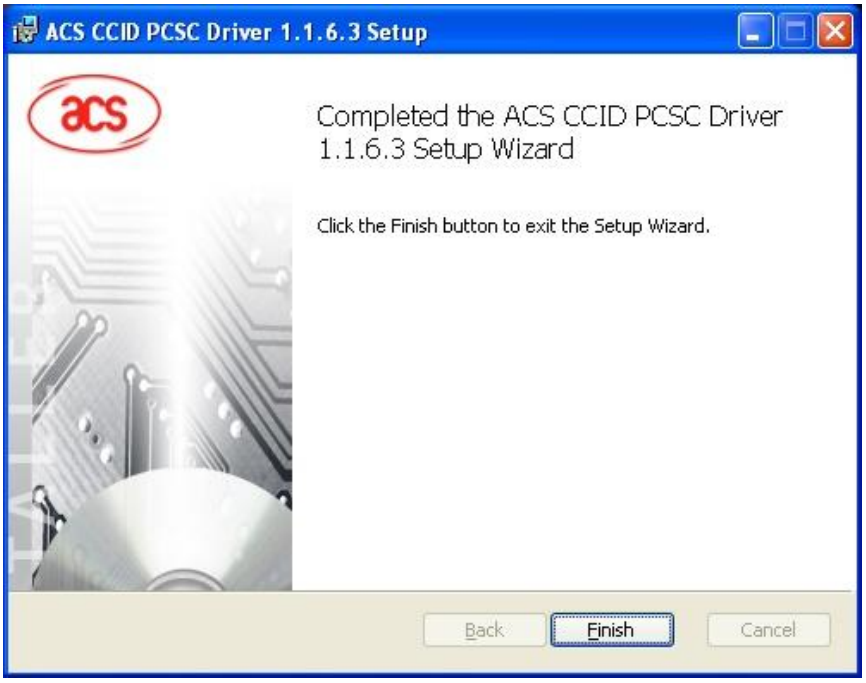
6. Click **Remove**



7. Wait for the Setup to be completed



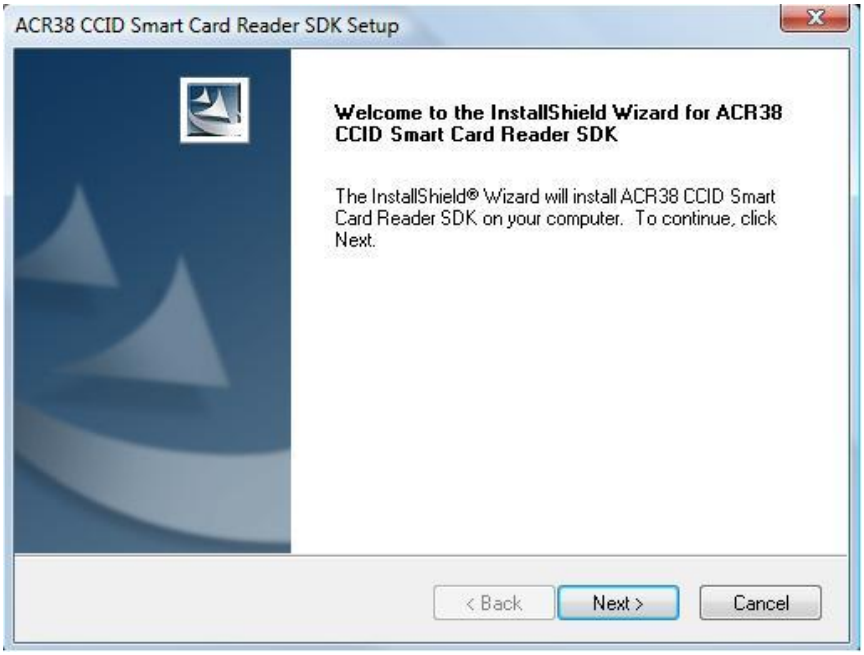
8. Click on **Finish** to exit program



8.0. SDK Installation

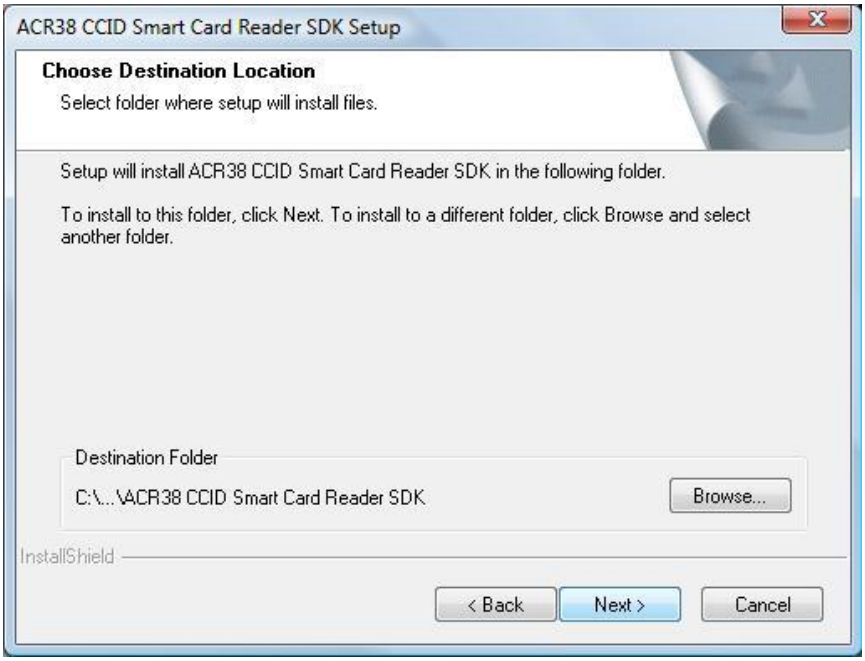
1. Click **"Step 3. Install SDK Components"** and you will be prompted with the InstallShield Wizard for ACR38 CCID Smart Card Reader SDK.

2. Please wait while InstallShield Wizard prepares the setup. Click **"Next"** to continue installation.

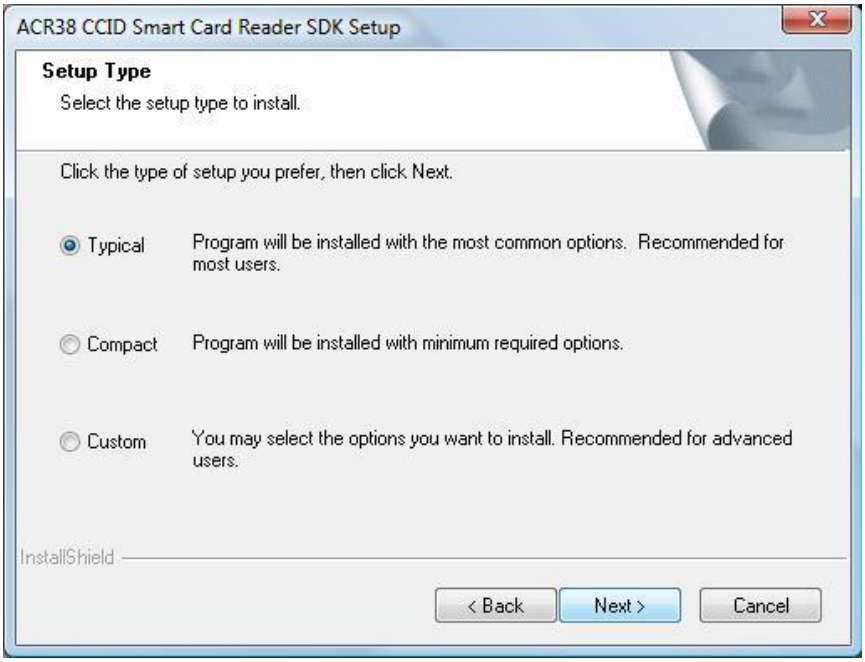


3. When prompted to choose the destination location, click on **"Next"**.

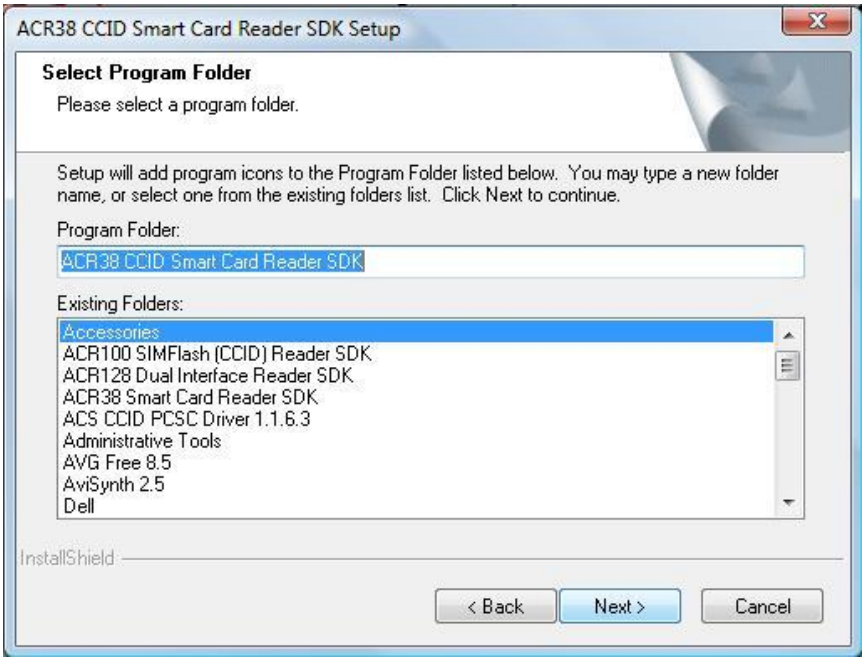
The default path where the SDK will be installed is **x:\Program Files\Advanced Card Systems Ltd\ACR38 CCID Smart Card Reader SDK** where **x** is the drive letter of your local Windows drive.



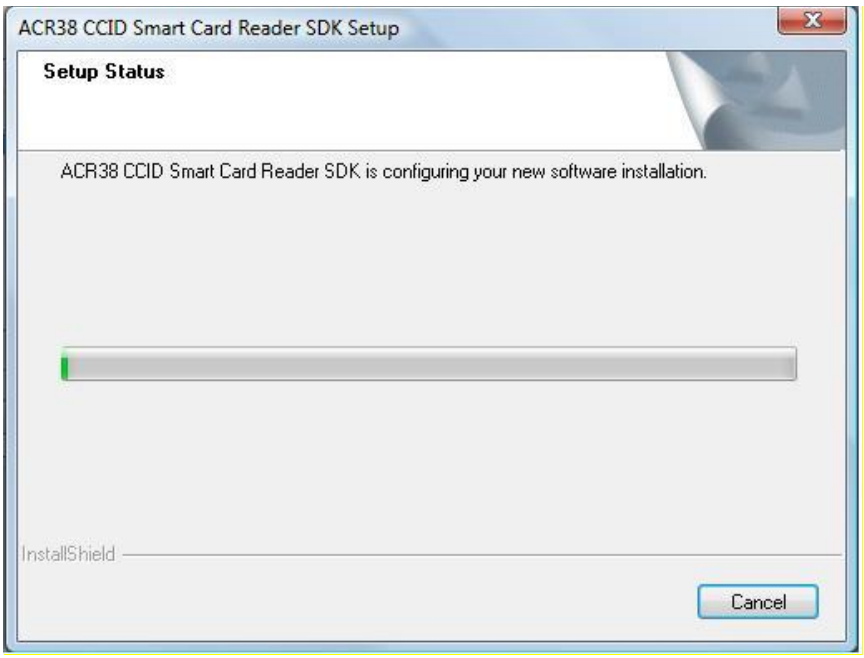
4. In the **Setup Type** window, leave the **Typical** option selected then, click **"Next"**.



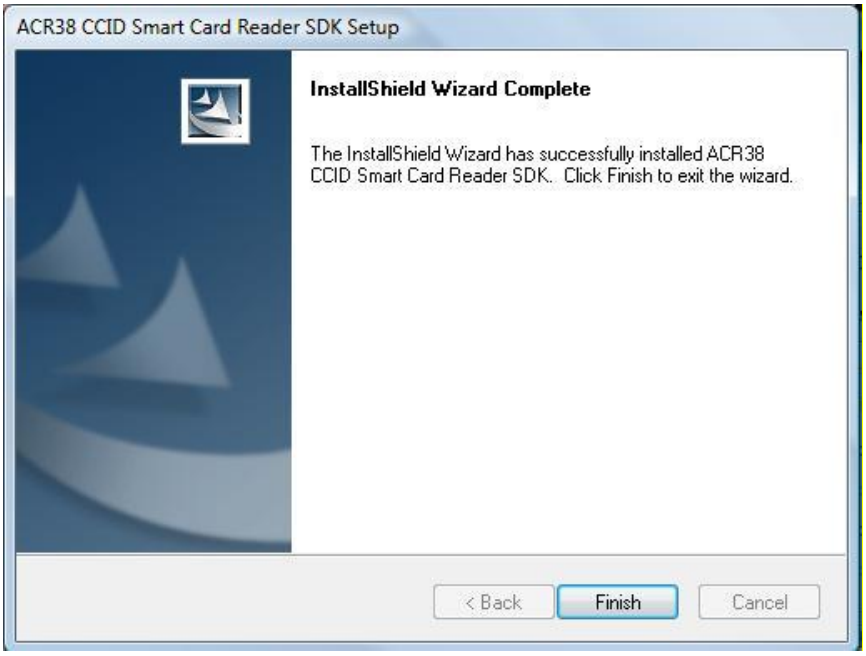
5. When prompted with the **Select Program Folder** window, click **"Next"**. Default program folder that will be created is **ACR38 CCID Smart Card Reader SDK**. If you want a different folder, type a new program folder name.



6. Please wait while the software is being configured.



7. ACR38 CCID Smart Card Reader SDK installation has been successfully installed. Click **"Finish"** to complete setup.



9.0. SDK Components

9.1. Sample Applications

9.1.1. Casino Demo

This Demo simulates ATM and Casino Applications using ACOS smart card as a pay-for-play card. The card serves as an ATM card or a re-loadable prepaid card where user can play games in the casino.

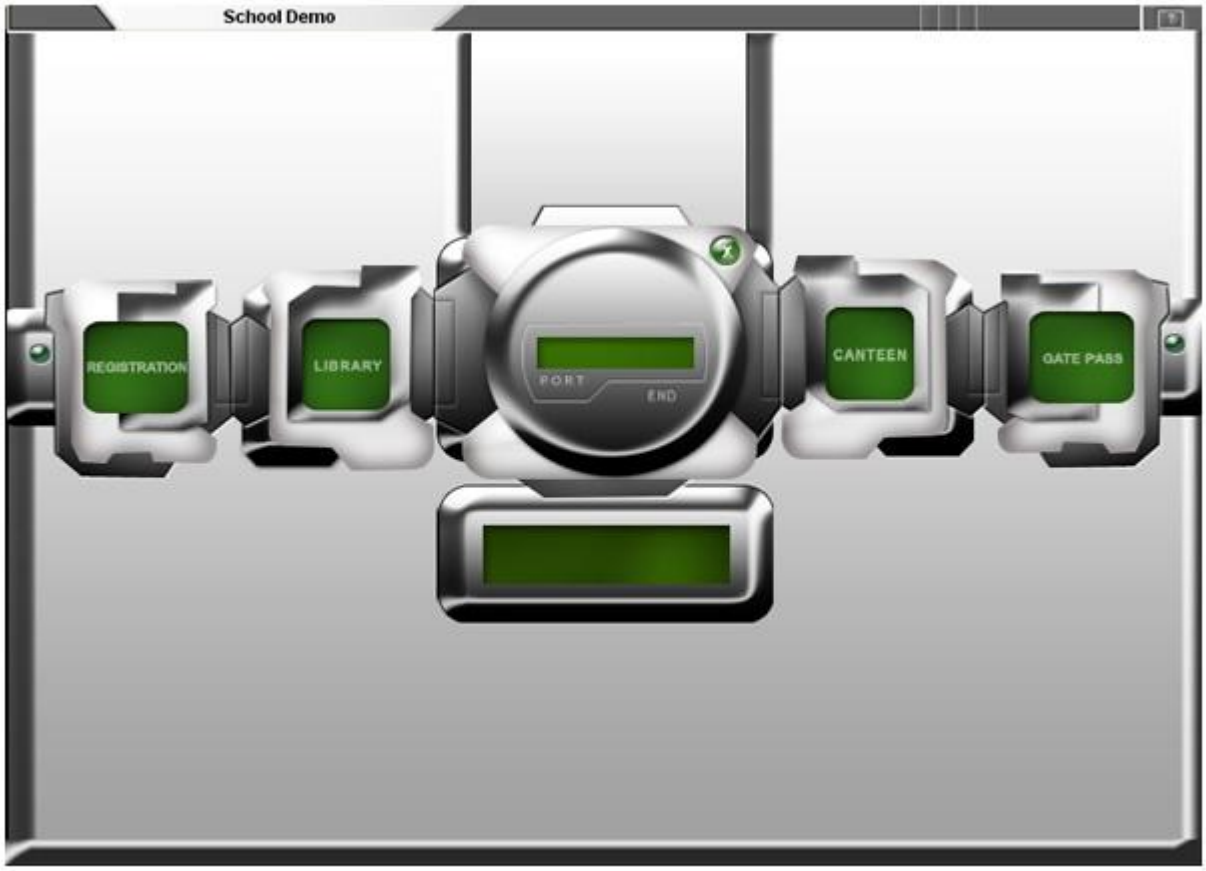
For detailed explanation on how to use the Casino Application, please refer to the Casino Demo User Guide.

9.1.2. School Demo

The School Demo demonstrates a multi-application program on a School Environment. The ACOS Card is used as:

- Student ID
- Library Card
- E-purse

For detailed explanation on how to use the School Application, please refer to the School Demo User Guide.



9.2. Sample Codes

The Kit includes a collection of sample ACR38 PC/SC programs with source codes for the user to quickly learn how to develop their own applications. It is written in various programming languages emphasizing certain features of the ACR38 reader and/or the smart cards included in the kit.

The sample codes are written in the following programming languages: Java, C#, Delphi, VB.NET, Visual Basic, Visual C++, and Visual C++ 2005 (x64).

9.3. Tools and Utilities

The SDK includes the following tools that will guide you in developing PC/SC-compliant smart card based systems:

Go to:

Programs → ACR38 CCID Smart Card Reader SDK →Tools and Utilities

9.3.1. CardTool

Is a utility program that allows you to send commands to any PC/SC-compliant smart card reader, and to any ISO-7816 T=0 compliant smart card. You can send commands to your ACR38 smart card reader using this tool.

Note:

Please choose PC/SC on the Driver Platform.

Refer to Help File for detailed explanation on how to use the CardTool.

9.3.2. PC/SC Learning Tool

Is a utility program that allows you to send commands to any PC/SC-compliant smart card reader, and to any ISO-7816 T=0 compliant smart card. It teaches you how to use the PC/SC APIs step-by-step and what parameters to use.

9.3.3. QuickView

This is a utility program that checks if you have properly installed your ACR3x readers.

9.3.4. Scripting Tool

The Script Commander PCSC Tool is software that allows you to send a pre-defined sequence of smart card commands to your CPU card. The commands are defined and stored in files called Script Command Files. Script command files can be opened, edited, and executed by this tool. A script command file contains a set of directives and card commands. The card commands are described later in this document.

9.3.4.1. System Requirements

Hardware

- IBM compatible Personal Computer with Intel Pentium Processor or higher
- ACS Smart Card Reader
- T=0 CPU card

Software

- Microsoft Windows 98SE / ME / 2000 / XP / 2003 / Vista
- PCSC Smart Card Reader Driver installed

9.3.4.2. Specific Requirements

Installation

The operator must install Script Commander PC/SC software on his PC via the ACR38 CCID SDK Installer.

Command File Syntax

The script command file may include special characters, card reader directives, card commands, and COMMANDER basic directives.

9.3.4.3. Special Characters

Comment Character

The ';' character is defined to start a comment in a line of the script command file. A comment must be placed as separate lines anywhere in a command file, all the characters following the ';' up to the end of the line are then considered to be part of the comment.

Note that comments cannot follow commands on the same line.

Correct example:

```
; This is a comment.
```

Wrong example:

```
This line will NOT be considered to be a comment.
A0 A4 00 00 02 3F 00  ; This line will NOT be considered a comment as well.
```

Indentation

The space and tabulation characters can be used for indentation.

9.3.4.4. Card Commands

Card Command Syntax

To send data to the card, the syntax is:

< CLA INS P1 P2 Lc Input_Data

where

CLA : command class (1 byte long),
INS : command instruction code (1 byte long),
P1 : first parameter of the command (1 byte long),
P2 : second parameter of the command (1 byte long),
Lc : length (in bytes) of the Input_Data (1 byte long),
Input_Data : data sent to the smart card (Lc bytes long).

All command fields are expressed in 2 Hexadecimal characters. After the command is sent, 2 status bytes SW1 and SW2 will be displayed in the Output Window (refer to Figure 1).

Example:

; Select Master File: CLA=A0 INS=A4 P1=00 P2=00 Lc=02 DATAIN=3F 00

< A0 A4 00 00 02 3F 00

To retrieve data from the card, the syntax is:

> CLA INS P1 P2 Le

where

CLA : command class (1 byte long),
INS : command instruction code (1 byte long),
P1 : first parameter of the command (1 byte long),
P2 : second parameter of the command (1 byte long),
Le : length (in bytes) of the Output_Data (1 byte long),

All command fields are expressed in 2 Hexadecimal characters. After the command is sent, byte(s) returned by card will be displayed in the Output Window (refer to Figure 1), followed by 2 status bytes SW1 and SW2.

Example:

; Get Response 0F bytes: CLA=A0 INS=C0 P1=00 P2=00 Le=0F

> A0 C0 00 00 0F
> XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX
> 90 00

9.3.4.5. User Interface

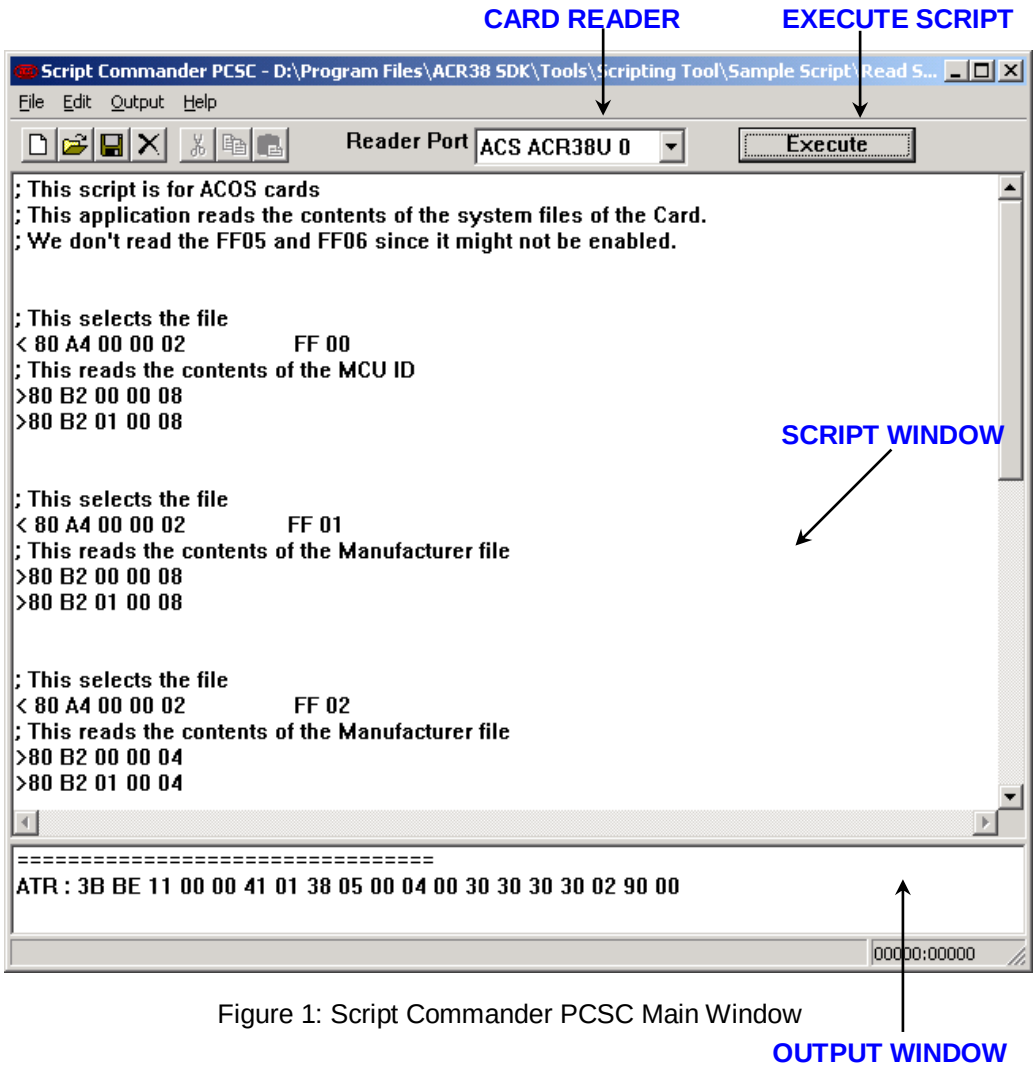


Figure 1: Script Commander PCSC Main Window

On the File Menu:

New	Creates a new script file.
Open	Opens a script file.
Save	Saves current script file.
Save As	Saves current script file with different filename.

On the Edit Menu:

Cut	Cuts the selection and puts it on the clipboard.
Copy	Copies the selection and puts it on the clipboard.
Paste	Inserts clipboard contents.

On the Output Menu:

Clear	Clears the results in the output window.

On the Help Menu:

About	Displays information about the Script Commander PCSC Tool.

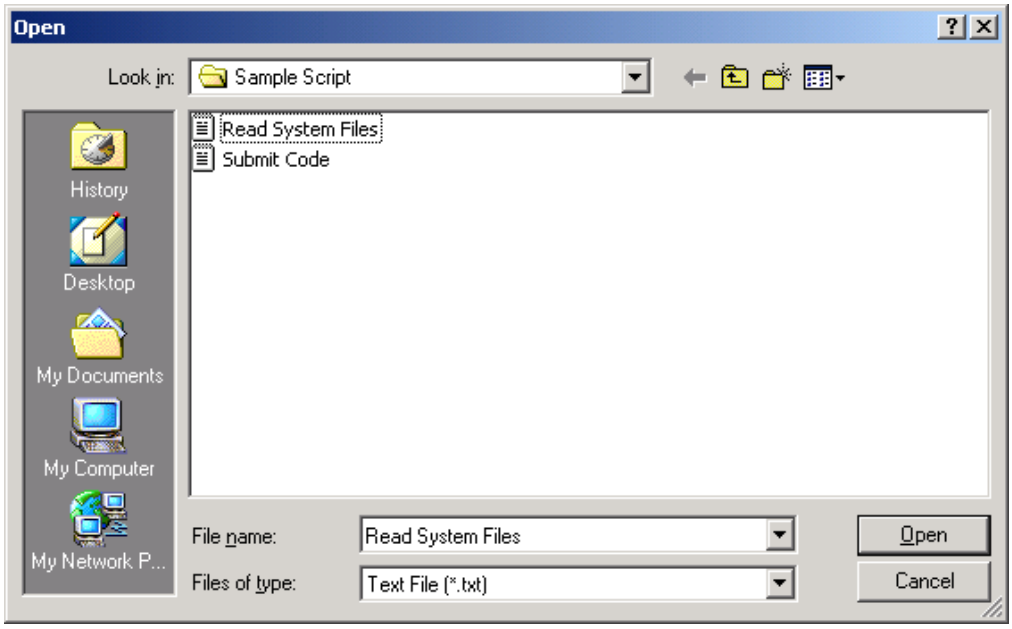


Figure 2: Dialog to specify the script command file

The default path where the Sample Script will be installed is **X:\Program Files\ Advanced Card Systems Ltd\ACR38 CCID Smart Card Reader SDK\Tools\Scripting Tool\Sample Script**, where **X** is the drive letter of your local Windows drive. Or at the destination directory you specified during the installation of the SDK Components.

User can select directories and file here. The default file extension of the Script files is .txt (Text File). After specifying the correct file, click on **"Open"** to return to the main window.

When the script file is selected, it is loaded into the program's Script Window. You can edit the script and save to file. To run the script, click on **"EXECUTE"**. Script Commander will first check if your script's syntax is correct, if no error is found, it will power up the card inserted in the selected reader (in Card Reader Port) and run the script. On card power up, the ATR is also displayed. All the script results will be displayed in the Output Window.

9.4. User Manuals and Reference Materials

The SDK includes the following documents:

- ACR38 CCID SDK User Manual
- ACR38 CCID Reference Manual
- ACR38 CCID PCSC Memory Card Access
- ACR38 CCID Change Log
- ACR38 CCID Technical Specifications
- ACR38T-IBS CCID Technical Specifications
- ABR Series - Balance Reader Technical Specifications
- ACOS3 Reference Manual
- Training Materials