

SoftCard 1.1

January 6, 2005

Web: <http://www.smartcache.net/>
E-mail: info@smartcache.net

Introduction

SoftCard is an application that emulates an ACOS1 ISO 7816 smart card. When used in conjunction with an RS-232-to-ISO 7816 interface conversion device, it can be used to take the place of a physical ACOS1 ISO 7816 smart card.

SoftCard implements all ACOS1 commands that are used by SmartCache, and SmartCache is 100% fully functional when using SoftCard in place of a physical ACOS1 ISO 7816 smart card.

SoftCard was used extensively in the development and test of SmartCache 2.0. Perhaps the greatest benefit provided by SoftCard in this respect was the thorough testing of the card initialization process performed by SmartCache; rather than having to burn \$5.00 per ACOS1 card (which can only be initialized once), SoftCard allowed this development to be performed at no cost. SoftCard saved me 100's of dollars, and at the same time provided me with capabilities that would be either difficult or impossible to provide with a physical ISO 7816 ACOS1 smart card.

Future versions of SoftCard will add features that provide the user with a rich set of capabilities for controlling the way the emulated smart card behaves. For example, giving the user the capability to force error conditions will allow for testing of applications that would be difficult or impossible to force with a physical smart card.

Requirements

To use SoftCard, you need an ISO 7816 Phoenix reader/writer and an "emulator" device, which is simply an RS-232-to-ISO 7816 interface conversion device. These devices are not really emulators because they do not and cannot emulate a smart card. Rather, they can be used as an integral part of an emulation setup, in which software such as SoftCard performs the real emulation. The terms "emulator" and "interface conversion device" are used interchangeably in this document.

SoftCard runs on Windows 95/98/ME/NT/2K/XP, and will most likely run on any future version of Windows. SoftCard is a standalone application—no third-party drivers or DLLs are required.

Configuring SoftCard

To configure SoftCard, connect an ISO 7816 Phoenix reader/writer to an RS-232 serial port that is being controlled by an application such as SmartCache. Insert the emulator board into the ISO card slot of the reader/write and connect the emulator to another RS-232 serial port that will be controlled by SoftCard. Note that SoftCard allows you to select any available serial port, including serial ports that are associated with USB-to-RS-232 interface conversion devices.

Using SoftCard

Once SoftCard is configured, you can use it to emulate an ACOS1 ISO 7816 smart card. An application such as SmartCache can be used as the controlling application in the emulation setup. You can run SmartCache as if it were interfacing with a physical smart card. There is nothing special that needs to be configured in SmartCache, other than selecting a Phoenix reader/writer (or a "plain" development terminal—see

the Baud Rate sections below for details) for the interface device; as far as SmartCache is concerned, it is interfacing with a real ACOS1 ISO 7816 smart card.

All that is needed to begin the emulation is to select the baud rate and COM port. In SoftCard, select the baud rate from the Baud menu. Then select the COM port from the Connect menu. SoftCard will now emulate an ACOS1 smart card.

Most of the menu items and toolbar buttons are self-explanatory (move the mouse over a toolbar button to display a tool tip). Pressing the ATR toolbar button in SoftCard displays a dialog that allows you to change some values in the ATR that SoftCard sends in response to the RESET signal.

Selecting New from the Card menu is equivalent to using a new, uninitialized ACOS1 smart card.

Baud Rate

When you configure SmartCache to interface with a Phoenix reader/writer, it communicates at a baud rate of 9600 bps. The reason for this is that the 3.57 MHz clock signal applied to the ISO CLK contact in a Phoenix reader/writer results in a baud rate of 9600 bps¹.

In an emulation setup, the clock signal is not used (there is no need for it, as there is no physical smart card in the loop). This is the reason that SoftCard provides all of the standard baud rates in the Baud menu. SoftCard can be configured to run at any baud rate that the controlling application supports.

SmartCache will interface at a baud rate of 115,200 bps when configured to interface with a development terminal. I have successfully tested emulation setups in which SmartCache is configured to interface with a development terminal (plain) and SoftCard is configured for a baud rate of 115,200 bps, and the performance is truly amazing.

The following table lists the time it takes to read the sample file (provided with SmartCache) when using a physical ACOS1 ISO 7816 smart card and SoftCard.

Reader/Writer	Smart Card	Baud Rate² (bps)	Read Time (seconds)
Whiteviper	Physical ACOS1 8K	9600 ³	6.72
Whiteviper	SoftCard	38,400	2.97
SDLOGIC SDR-30RS	SoftCard	115,200	2.01
Netsignia 210	SoftCard	115,200	2.02

¹ ISO 7816-3 specifies that the card transmits the ATR at a baud rate of $F/372$, where F is the clock frequency in MHz. ISO 7816-3 also defines baud rate conversion factors in the ATR that allow the card to communicate at a baud rate that is an integer multiple of $F/372$. The integer multiple is 1 for the ACOS1 ISO 7816 smart card.

² This is the highest baud rate at which the reader/writer operated. All reader/writers operated at all standard baud rates below this value. Baud rates other than 9600 and 115,200 were tested with the latest unreleased version of SmartCache.

³ This is the only baud rate that a physical ACOS1 8K smart card will work at when using a Phoenix reader/writer with SmartCache.

The following figures depict emulation setups using various ISO 7816 Phoenix reader/writers. In all cases, an SDLOGIC SD-EMU was used for the RS-232-to-ISO 7816 interface conversion device. SmartCache is interfacing with the ISO 7816 Phoenix reader/writer, and SoftCard is interfacing with the SD-EMU. SmartCache is running in “Test” mode (continuous reads of card), as can be seen by the activity LEDs on some of the ISO 7816 Phoenix reader/writers and the SD-EMU (green LED).

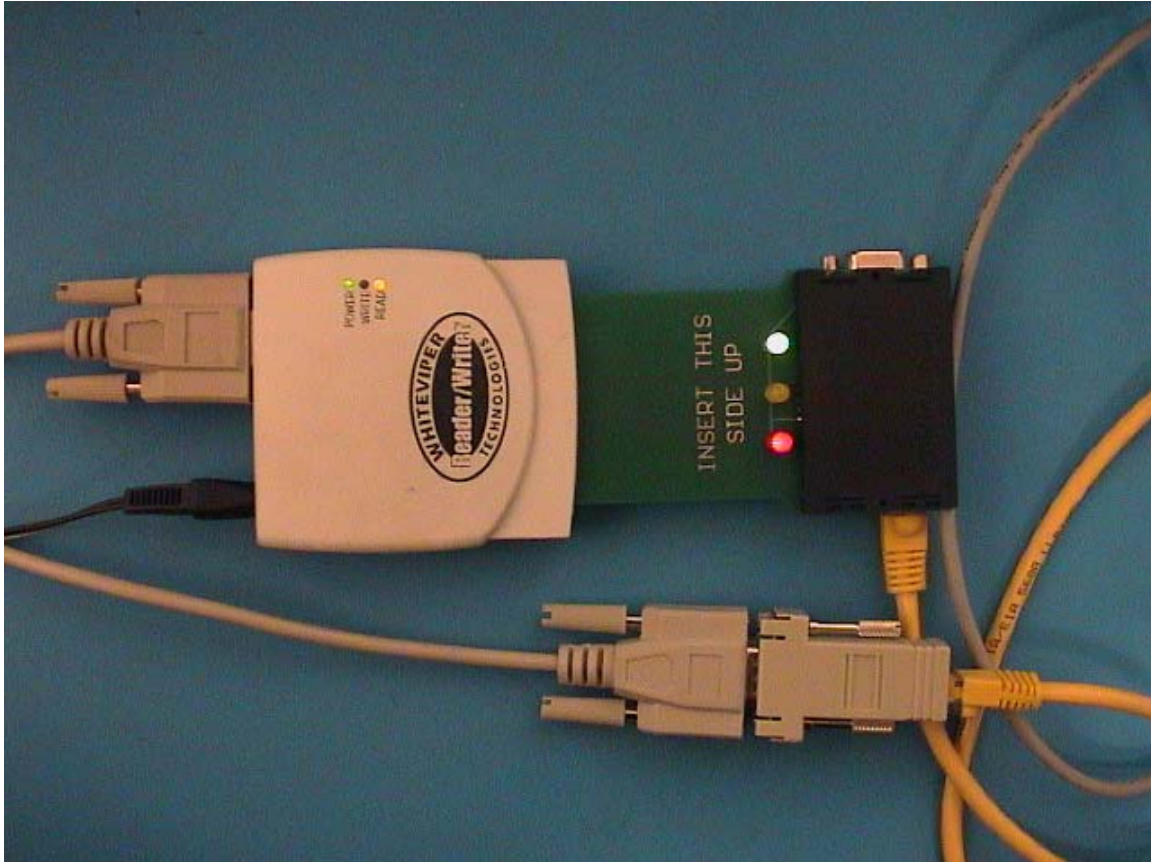




Figure 2: SDLOGIC SDR-30RS ISO 7816 Phoenix reader/writer and SDLOGIC SD-EMU emulation setup.

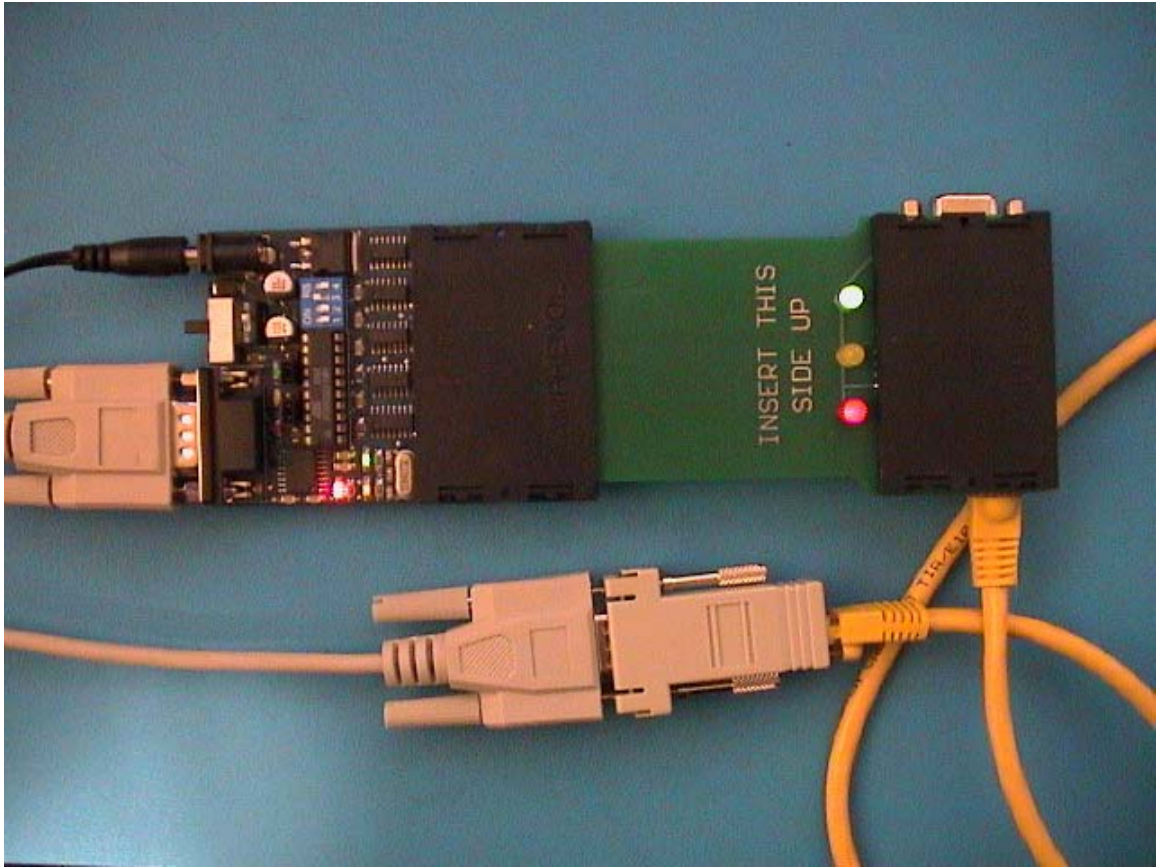


Figure 3: SD7816U SE ULTRA USCT SMART CARD DEVELOPMENT TERMINAL and SDLOGIC SD-EMU emulation setup. Note the mode switch on the SD7816U is configured for a Phoenix reader/writer.



Figure 4: Netsignia 210 ISO 7816 Phoenix reader/writer and SDLOGIC SD-EMU emulation setup.



Figure 5: Didya ISO 7816 Dual Crystal Smart Card Programmer and SDLOGIC SD-EMU emulation setup.