Information Tools

Starter Kit ISO 14443-A/B

Capabilities Guide

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SYNOPSIS

1. INTRODUCTION

Are you planning to include smartcard capabilities in future products?

Engineering companies and systems integrators which need to offer contactless card readers understand the need for the hardware, such as that provided by industry-leader Philips, to implement these readers. Over the past five years, through its dedicated focus on contactless smartcard readers, Pro-Active has developed unique expertise in the development of these solutions, and offers a powerful tool-box which greatly speeds up the integration of contactless readers. Pro-Active is a beta-test partner of Philips, and has a close working relationship with their R&D team.

This document describes at a high level the benefits of using the Pro-Active MOD-K531 smartcard reader module, and its associated SDK, by any organization planning to develop contactless smartcard capabilities.

2. CORE CHIPSET, FIRMWARE, AND MIDDLEWARE

The core Philips chipset, which is implemented in the MOD-K531, needs to be supplemented with a wide range of firmware in order to be field-deployable. Use of the core chipset guarantees that the reader will be 100% compliant with the ISO 14443 standards, and will be interoperable with all conformant cards and tags. Since Philips provides a very limited set of software with its core chipset, Pro-Active has focused on providing a broad set of tools to obtain the full benefits of the Philips chipset while greatly facilitating implementation.

As various versions of Mifare (ISO 14443) cards have emerged, different firmware has been required to deal with different memory mapping: Ultralight, 1K, 4K, Desfire, etc. The initial Mifare standard (ISO 14443-A), essentially controlled by Philips, has now been supplemented by the broader, more flexible ISO 14443-B which allows other companies to define modulation specifications within the standard. ISO 14443-B is not a single standard, but a generic set of rules which leads to a need for firmware modifications to meet each specific vendor's Of course, any generic reader must be able to handle all forms of these cards indifferently.

And while the most recent RC531 chipset allows communications with ISO14443-B cards as well as the traditional ISO14443-A modulation, Philips provides no tools for communicating with these increasingly common cards. As the number of contactless applications multiply (passports, banking, government ID, secure access, etc.) there is an increasing demand for interoperable readers able to support A or B cards. In addition, the Mifare DESfire standard presents substantial new complexity, since this card is no longer just a secure memory card, but rather a full microprocessor card with a powerful on-board operating system which needs to be managed.

As the number of different types of cards has multiplied, Philips has focused on its core business of low-level chip design, leaving the specialized task of developing the middleware to interface between cards, readers, and platforms to specialists like Pro-Active.

Of course, there is an extensive range of additional card operating systems which work within the ISO14443 framework, such as JavaCards, ProX, BasiCard, Multos, FlashCOS, etc. Each of these require specific middleware to facilitate communications between applications and the card via the reader. The wide range of APIs provided with the Pro-Active module greatly facilitate this task.

3. HARDWARE PLATFORMS

A wide number of platforms are being used to support card readers: Windows XP, CE, Linux, as well as a large number of embedded systems. Combined with all the various card types, the possible permutations of software and firmware required rises exponentially as platforms and cards evolve. Only companies like Pro-Active, which are committed to constantly keep up with this ever-changing market, are able to stay current. In Europe, where smartcard deployment has been much more extensive than in the US, most major smartcard systems integrators now rely on tools provided by specialized middleware companies, so they can focus their engineering resources on areas which allow them to differentiate their product offerings.

Microsoft has, in particular, released a series of protocols for communicating with smartcards. Currently its primary protocol, PCSC, allows communications via standard T=0, T=1, and T=CL interfaces. Each combination of different versions of Windows, different microprocessors (8, 16, or 32-bit), different readers, and different cards requires specific firmware. Once communications are established, tuning is required to increase read/write speed and to guarantee reliability under any condition. This is naturally dependent as well on the type of interface used: serial, USB, or some other (CF, SD, etc.)

In fact, speed of read/write is often a determining factor in an application – either because the user finds a given delay unacceptable, or because a delay leads to "tearing" (when a card is withdrawn from the field prior to a transaction being completed.)

Whether or not the RF components, including the antenna, are provided by Pro-Active or not, there is always an issue of shielding. Care must be taken to avoid interference from external components, and to avoid the module impacting RF performance. The Pro-Active MOD-K531 is packaged in a shielded housing which is carefully designed to preclude any concerns about shielding.

4. PRO-ACTIVE – AN ONGOING COMMITMENT TO READER TECHNOLOGY

It a daunting task to develop a reader capable of functioning in the wide range of environments described above. But one must also maintain systems over time as new cards, new platforms, and new standards are released. Pro-Active, being dedicated to the contactless smartcard reader market, has proven its commitment to maintaining and optimizing its software to meet the expanding range of customer requirements, and will continue to do so in the future. Aside from regularly releasing new versions of its software, drivers, and firmware, Pro-Active offers the capability to field-upgrade firmware via the use of Flash memory.

For systems integrators using embedded processors, Pro-Active provides the source code of drivers which are optimized for various platforms. This allows these solutions to be fully integrated into a packaged solution. In addition, Pro-Active provides a range of sample applications (such as store-of-value and identity management) with their source code. Aside from being highly instructive, these are often used to provide the basis for an already-functioning solution which can be easily modified to meet specific customer application requirements.

Of course, ongoing support through extensive documentation and unlimited technical support (via email) is also available to all Pro-Active customers. As experts in the deployment of smartcard solutions, Pro-Active has been involved in thousands of smartcard deployments, and as a result can help customers avoid some of the pitfalls if they are new to the world of smartcards.

5. CONCLUSION

Most engineering firms have come to the conclusion that mastering reader technology, as described above, is not a "strategic differentiator", and prefer dedicating their engineering resources in areas which can provide competitive advantage. As smartcards and smartcard readers become commoditized like magstripe and barcode readers, these firms increasingly turn to specialists like Pro-Active.