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Smart Card
Handbook

Third Edition

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Preface to the Third Edition

The English version of the *Smart Card Handbook* has now reached its third edition. In comparison with the previous edition, it has been considerably expanded and thoroughly updated to represent the current state of the technology. In this book, we attempt to cover all aspects of smart card technology, with the term 'technology' intentionally being understood in a very broad sense.

As in previous editions, we have remained true to our motto, 'better one sentence too many than one word too few'. We have described this ever-expanding subject in as much detail as possible. Even more examples, drawings and photographs have been added to make it easier to understand complicated relationships. The glossary has been enlarged to include many new terms covering all essential concepts related to smart cards, and it has been enhanced with cross-references. In many cases, it can provide a quick introduction to a particular subject. Altogether, these additions, extensions and improvements have resulted in a book that is more than three times as large as the first edition.

Here we can make a small comparison. Modern smart card operating systems currently comprise 120,000 lines of source code, which roughly corresponds to two books the size of the present edition. Even if you are not familiar with programming, you can readily appreciate how sophisticated these operating systems have become.

These small, colorful plastic cards with their semiconductor chips continue to spread from their original countries, Germany and France, throughout the world. In the coming years, this technology can be expected to outstrip all others, especially since it is still in its infancy and there is no end or consolidation in sight.

Smart card technology progresses in leaps and bounds, and we attempt to keep pace by publishing a new edition of the *Smart Card Handbook* every two to three years. The *Smart Card Handbook* represents the present state of technical knowledge, and in areas that are presently undergoing rapid change, we indicate possible paths of evolution. If certain things come to be seen differently at a later date, we can only remark that no one knows what the future will bring. Despite this, or perhaps just because of this, we welcome all comments, suggestions and proposed improvements, so that this book can continue to cover the subject of smart cards as completely as possible. Here we would like to explicitly thank the many attentive and interested readers who have pointed out unclear or ambiguous passages and errors. Once again, an errata list for this edition will be made available at www.wiley.co.uk/commstech/.

We would also like to thank our many friends and colleagues who have repeatedly offered valuable (and occasionally somewhat uncomfortable) suggestions for making this book better

and more complete. We would particularly like to thank Hermann Altschäfl, Peter van Elst, Klaus Finkenzeller, Thomas Graßl, Michael Schnellinger, Harald Vater and Dieter Weiß, as well as Kathryn Sharples at Wiley for her helpful support and Kenneth Cox for the translation.

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Introduction

This book has been written for students, engineers and technically minded persons who want to learn more about smart cards. It attempts to cover this broad topic as completely as possible, in order to provide the reader with a general understanding of the fundamentals and the current state of the technology.

We have put great emphasis on a practical approach. The wealth of pictures, tables and references to real applications is intended to help the reader become familiar with the subject rather more quickly than would be possible with a strictly technical presentation. This book is thus intended to be useful in practice, rather than technically complete. For this reason, descriptions have been kept as concrete as possible. In places where we were faced with a choice between technical accuracy and ease of understanding, we have tried to strike a happy medium. Whenever this proved to be impossible, we have always given preference to ease of understanding.

The book has been written so that it can be read in the usual way, from front to back. We have tried to avoid forward references as much as possible. The designs of the individual chapters, in terms of structure and content, allow them to be read individually without any loss of understanding. The comprehensive index and the glossary allow this book to be used as a reference work. If you want to know more about a specific topic, the references in the text and the annotated directory of standards will help you find the relevant documents.

Unfortunately, a large number of abbreviations have become established in smart card technology, as in so many other areas of technology and everyday life. This makes it particularly difficult for newcomers to become familiar with the subject. We have tried to minimize the use of these cryptic and frequently illogical abbreviations. Nevertheless, we have often had to choose a middle way between internationally accepted smart card terminology used by specialists and common terms more easily understood by laypersons. If we have not always succeeded, the extensive list of abbreviations at the front of the book should at least help overcome any barriers to understanding, which we hope will be short-lived. An extensive glossary in the final chapter of the book explains the most important technical concepts and supplements the list of abbreviations.

An important feature of smart cards is that their properties are strongly based on international standards. This is fundamentally important with regard to the usually compulsory need for interoperability. Unfortunately, these standards are often difficult to understand, and in

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