First Multi-application Smart Card Recognized as GlobalPlatform Compliant—Dramatically Increases Application and Data Storage to Enable True Multi-application Usage

NTT has developed the world's first smart card complying with GlobalPlatform™*1 V2.1 specifications, which are recognized as the *de facto* standard for multi-application smart card*2 platforms in financial and other fields. It also offers the world's largest memory capacity (1 MB) for this type of card. Because this card offers far more memory than existing GlobalPlatform™ cards that comply with older specifications, it can hold several times as many application programs and store huge volumes of data, such as fingerprints and other biometric information required for biometric authentication*3. This card also offers a number of features not available in existing GlobalPlatform™ cards, such as contactless interfaces*4 and functions for executing programs written in C language*5. This will enable GlobalPlatform™ cards to be used in fields that emphasize speed and contactless operation, such as electronic tickets, electronic money, and building entry management cards. With these functions, NTT has created a true multi-application smart card that can be used for a wide range of purposes even outside the financial field (**Fig. 1**).

Background

NTT has been developing multi-purpose, multi-application smart cards for several years and has been a member of GlobalPlatform™ since the consortium was first established. The memory capacity for storing downloaded application programs in earlier GlobalPlatform™ cards was between 16 and 64 KB, so no more than five or six applications could be downloaded. These cards did not have enough memory to hold applications in non-financial fields or allow the card to be used in biometric authentication. Most of the cards only had contact-type interfaces*6, and in many cases the processing speed was limited, so application programs could only be created in Java language*7. This meant that it was difficult to use these cards in fields where contactless interfaces and high-speed processing were emphasized.

Features

(1) World's first card recognized as GlobalPlatform compliant
The card is the first in the world complying

*1 GlobalPlatform™: A consortium established in 1999 by various cross industry companies and organizations. This consortium creates GlobalPlatform™ specifications that define, for example, architectures for multi-application smart cards targeting mainly the financial field, and command specifications for downloading application programs.

*2 Multi-application smart card: A smart card that allows several applications to be installed in a single card, thus increasing convenience by enabling one card to be used for multiple services.

*3 Biometric authentication: A method of identifying an individual based on unique physical characteristics, such as fingerprints, iris pattern, or voice.

*4 Contactless interfaces: A method in which a coil (antenna) is embedded within the smart card, and data is transmitted without the smart card having to come into contact with the smart card reader.

*5 C language: A compiler-type programming language that enables structured programming. Programs described in C language are converted by a C compiler into code that can be directly executed by the CPU (native code), making C language more suitable for high-speed processing than programming languages that are converted into an intermediate code.

*6 Contact-type interfaces: A method in which the smart card and the smart card reader are connected by a multi-pin (typically six or eight pins) external terminal, and data is transmitted through this connection.

*7 Java language: Java is an intermediate code executed, object oriented programming language. Programs described in Java language are converted into an intermediate code that does not exist in the executing CPU, and are executed on a Java Virtual Machine (Java VM). For this reason, programs described in Java can be executed even in differing operating environments, as long as the environment running the program is a Java VM.

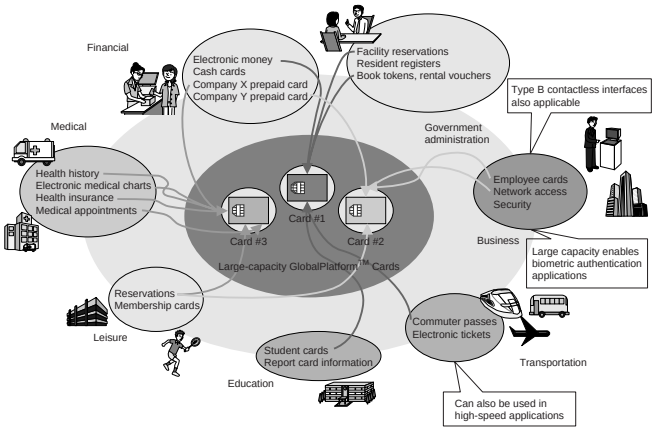

Fig. 1. Application fields for large capacity GlobalPlatform™ smart cards.

with GlobalPlatform™V2.1 specifications, which are regarded as the *de facto* standard for multi-application smart card platforms.

(2) Memory capacity of 1 MB, the largest of any GlobalPlatform™ card in the world

It provides more than 300 KB of memory for storing downloaded application programs and over 100 KB for biometric authentication data.

(3) Support for contactless interfaces

This card is compatible with not only ISO7816 contact-type but also ISO14443 Type B contactless interfaces. Processing can be completed when the smart card comes close to the reader/writer, which dramatically improves the operability of GlobalPlatform™ cards used for electronic money or building entry management. There is no need to distinguish between application programs that use contact or contactless interfaces, so existing application programs designed for contact interfaces can be used with contactless interfaces with almost no modification.

(4) Support for C language programs

In addition to Java language, which requires a virtual machine, the card can handle application programs written in C language, which generates formats that can be executed directly by CPU commands. These application programs also offer a function that enables them to be started up first when the card is activated. In this way, NTT has achieved practical processing performance even for application programs that emphasize high-speed operations, as in the case of electronic tickets.

Future plans

To develop this smart card for each field, we are improving the smart card platform that offers card application program download, which is the feature of GlobalPlatform™ specifications. For some time now, NTT has been developing a smart card information sharing platform called NICE*8, which will

*8 NICE: Network-based IC Card (smart card) Environment. NICE is the multi-application smart card information-sharing platform developed by NTT. It lets a user safely download an application program onto a smart card via a network or safely delete a downloaded application program.

enable application programs to be downloaded safely to smart cards via the Internet and other networks whenever they are needed. In the future, NICE will enable the downloading of application programs to GlobalPlatform™ cards in order to promote expansion into various fields.

For further information, please contact
NTT Information Sharing Laboratory Group
Musashino-shi, 180-8585, Japan
E-mail: koho@mail.rdc.ntt.co.jp

Joint Experiment on Broadband Network for Intelligent Social Infrastructure in the 21st Century —Application of World's Fastest (43-Gbit/s) Testbed System Capable of Transmitting a DVD Movie in One Second

Keio University, NTT East, and NTT have begun using the world's fastest (43-Gbit/s) testbed system in an actual field environment. After signing an agreement on July 15, 2003 for a joint experiment, they completed preparations for the test and began operating the testbed network on October 24, 2003.

Based on next-generation application research such as the 21st Century COE (center of excellence) project promoted by Keio University called the "Next Generation Media and Intelligent Social Infrastructure" and various other projects, this joint experiment aims to implement a next-generation network using an ultrahigh-speed network that can support the broadband applications that Japanese society will need in the future.

Background

With the spread of the Internet, broadband access networks such as FTTH (fiber to the home) and xDSL (digital subscriber lines) have progressed. We can expect a rapid increase in data traffic and diversification of services in future, and advanced application technology based on high-capacity networks will spread to provide new services such as image system content-streaming delivery, peer-to-peer (P2P) communications, Internet delivery of broadcast programs, and large file transfer. On the other hand, core optical networks that can provide capacity greater than one terabit per second through a fiber have emerged, and networks that can flexibly handle various interface protocols have become necessary.

Keio University, which has developed various large-volume contents and wide-area applications to establish the future intelligent social infrastructure, in conjunction with NTT East and NTT Network Innovation Laboratories will clarify the requirements for high-capacity networks in the broadband era, evaluate the network quality of the long-term application of these networks, and select subjects for testing on the network system. This joint experiment should lead to the creation of new broadband applications that fully utilize the characteristics of the ultrahigh-speed network, and system development will progress aiming at ultrahigh-speed high-capacity backbone networks of the Internet and high-speed information transmission networks between data centers etc. We expect that these will be useful in implementing the intelligent social infrastructure required by Japanese society in the future.