

Proposal For Project to Develop A New Standard

Interoperability Framework for Contactless Fare Payment Technologies and Systems

1 Source of the Proposal Standard

1.1 Title:

Information Technology - Transit Fare Cards – Interoperability Framework for Contactless Fare Payment Technologies and Systems

1.2 Date Submitted:

November 30, 2005

1.3 Proposer:

Port Authority of New York and New Jersey, Office of Regional Smart Card Programs through INCITS B10

2 Process Description of the Proposal Standard

2.1 Project Type: Development

D – This project is the development of an ANSI standard using the INCITS fast track process.

2.2 Type of Document:

Standard

2.3 Definition of Concepts and Special Terms:

The proposed standard defines a structure for data storage within a contactless smart card (a.k.a. proximity integrated circuit card or PICC) or similar payment medium for use within a regional program for electronic fare payments for mass transportation services. The standard utilizes an object-oriented architecture that includes a comprehensive set of data elements required to support a highly flexible and complex fare structure as is required in modern mass transit fare collection systems. Various required and optional objects are defined in a manner that ensures support for individual agency programs as well as multi-agency, regional systems. The standard also defines the physical, electrical and logical

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requirements for contactless readers (a.k.a. Card Interface Devices - CIDs and proximity coupling devices - PCDs), as well as a distinct structure for messages that will be used to transfer information between the readers, agency central computers (ACCs) and regional clearinghouse (RCH) system.

The proposed standard is intended to provide the means to achieve interoperability between disparate fare collection systems and smart payment products without the typical reliance on proprietary, single integrator solutions.

2.4 Expected Relationship with Approved Reference Models, Frameworks, Architectures, etc:

This standard will reference and be predicated on ISO/IEC 14443 and ISO 7816-4 and may also be related to ANSI/INCITS B10.9's Interoperability framework for integrated circuit cards. In addition, the RIS Proof of Concept (PoC) demonstration system (developed by the Proposer) demonstrates that the concept of an object-oriented data structure is viable for integration within a fare collection environment.

2.5 Recommended INCITS Development Technical Committee:

B10 – Identification Cards and Related Devices

2.6 Anticipated Frequency and Duration of Meetings:

The meeting schedule for this project may follow B10's regular meeting schedule provided that it does not conflict with the B10.5 meetings. If the committee requires additional meetings, the frequency of such meetings must be determined by the chairman of the committee or sub-committee.

2.7 Target Date for Initial Public Review (Milestone 4):

January 2006.

This project proposal is a candidate for the INCITS fast-track processing option.

2.8 Estimated Useful Life of Standard:

Given that the public transportation industry has historically completed replacement and upgrade of existing fare payment technologies over a 7

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to 21 year cycle, this standard is expected to be viable for at least five (5) years and up to twenty (20) years, subject to the continued evolution of contactless smart cards and similar chip-based payment technologies and the adoption rate of the standard among North American transit agencies.

3 Business Case for Developing the Proposal Standard

3.1 Description

This proposed standard defines a data architecture that facilitates both interoperability of contactless smart cards and similar payment media with associated reader technologies for mass transportation electronic fare collection systems as well as multi-agency interfaces with a common RCH. The proposed standard is intended for use in agency or region-specific transit fare collection applications. In the past, such applications have traditionally been agency-specific and vendor proprietary, preventing interagency or regional interoperability, open procurement of smart card and reader components or integration with common RCH systems. The proposed standard will serve the growing requirement for regional interoperability, enabling use of common transit smart card media on the front end and common clearing and settlement facilities on the back end.

The proposed standard is based on the Port Authority's Regional Interoperability Standard for Electronic Transit Fare Payments[®] (RIS) Release 3.7, Parts 0, 2, 3, and 4. The RIS has been adopted by the American Public Transportation Association (APTA) as the basis for its development of Universal Transit Farecard Standards for its members.

The data architecture defined by the proposed standard employs data objects containing specific elements that collectively define a fare payment related transaction. These objects include:

Directory Index Object: An object used to identify all other objects included within the data structure, their contents and logical position within the architecture.

Transit Application Profile Object: An object used to record unique characteristics and data elements required for processing of transit transactions.

PICC Holder Profile Object: An object used to record cardholder-specific data elements and preferences.

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Product Index Object: An object used to define pointers to the fare product and transaction history objects stored within the data structure.

Add & Deduct History Object: An object used to record data associated with the last transaction involving the addition or deduction of stored value. This information is used to recover this data in the event data corruption occurs with the next transaction.

Transaction History Object: An object used to record the data associated with the last transaction of any type performed by the payment medium. This object is used extensively by support recordkeeping, accounting and fraud analysis.

Fare Product Objects: One or more objects used to record the specific characteristics of each fare product stored on the payment medium.

This data architecture is supported by use of standard operating system (application protocol data unit) commands as defined within ISO 7816-4 for access, reading, updating and securing data stored on the payment medium. Also defined within the proposed standard is the structure and content of messages to be used to transfer messages between the reader device, the ACC and the RCH.

A Proof of Concept (PoC) demonstration system using contactless smart technology products (smart cards and readers), a software application that mimics the functions of a fare collection system and a graphical user interface was also developed by the Port Authority in order to validate the general technical viability of the data structure and security requirements defined in the RIS. The technical documentation derived from the PoC demonstration system is publicly available for review.

3.2 Existing Practice and the Need for a Standard:

The mass transit industry is rapidly adopting contactless payment technologies for fare collection in order to replace and upgrade existing systems using magnetic tickets and tokens and to establish regional solutions for fare payment. To achieve interoperability between agency systems, agencies and regional authorities in North America have relied exclusively on solutions proprietary to suppliers and integrators. While such solutions have proven to be technically viable, the use of proprietary solutions has led to long-term reliance on such suppliers and integrators and minimal options for the agency/authority when procuring new products, services or upgrades for those systems. Accordingly, the establishment of a non-proprietary standard is widely considered to be the

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ideal resolution to these issues provided that the standard supports the complex fare policies required by all transit regions and can be implemented in a manner that meets the performance requirements of the transit industry. Although established standards (such as ISO/IEC 14443 and ISO 7816-4) aide in this effort, those standards do not provide the breadth or depth required to achieve interoperability between fare systems.

The proposed standard leverages established standards and builds upon them to define a more complete set of requirements for interoperability. The standard has also been defined to encourage open, competitive procurement of certain key system components (e.g. payment media and readers) and to achieve RCH interoperability through establishment of a common messaging protocol and structure.

3.3 Implementation Impacts of the Proposed Standard

3.3.1 Development Costs:

There are no anticipated costs to INCITS for support of the review and development of this proposed standard since these efforts can be conducted within the existing committee meeting schedule.

3.3.2 Impact on Existing or Potential Markets:

Achieving system and system component interoperability via use of a standard will be a critical milestone for the public transportation industry. The absence of such a standard currently causes mass transit system operators to utilize and rely on proprietary solutions and long term agreements with the integrators/providers of such solutions. Such solutions inhibit the ability for system expansion and introduction of new functionality and often eliminate the potential to competitively procure system services, enhancements or replacement components. The need for such a standard is widely recognized among transit system operators in North America as well as industry groups including APTA, the US Department of Transportation and the Federal Transit Administration. The concepts defined in the proposed standard have been widely discussed among and have met little resistance from contactless technology providers and fare collection system integrators, making rapid adoption of the standard, once formally approved by ANSI, a likely occurrence. Establishment of a national standard, as proposed, will enable the public transportation industry to leverage its collective purchasing strength to reduce many aspects of fare collection system cost and, consequently, the cost of providing public transportation services.

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3.3.3 Cost and Methods for Conformity Assessment:

Conformity assessment (i.e., validation and performance), against the proposed standard should be conducted by accredited test laboratories selected by ANSI using procedures and test requirements specific to the proposed standard. The Port Authority is developing RIS conformance test specifications which may form an appropriate structure or baseline for testing of the proposed standard. It is the intention of The Port Authority to make this document (RIS: Part 5 Conformance Testing) available once completed to ANSI at no cost.

3.3.4 Return on Investment (ROI):

Specific ROI for any single agency or regional authority that utilizes the proposed standard will be dependent on a variety of factors including, but not limited to, the overall size of the fare payments program, the number of participants and the period of time for which ROI is calculated. The procurement and operating cost of fare collection systems in North America typically exceeds US\$250 million annually. If the implementation of the proposed standard can reduce these costs by 5%, the net cost savings or cost avoidance for transit system operators will be millions of dollars over the life of each system and potentially tens of millions during the expected useful life of the standard. In addition, transit system patrons will benefit from the increased convenience and customized fare products and services that will be enabled through use of the proposed standard.

3.4 Legal Considerations:

The proposed standard was developed independently by the Port Authority. While the Port Authority retains copyrights to the full name of its standard, 'Regional Interoperability Standard for Electronic Transit Fare Payments', and to its acronym, 'RIS', the proposed standard is otherwise believed to be free of any IPR or licensing restrictions, and – except in regard to use of this name and acronym – it is the intention of the Port Authority to make the standard available to ANSI without restriction following ANSI approval.

3.4.1 Patent Assertions:

At the time of the submission of this proposal standard the Proposer is not aware of any patent infringement claims, and no patent assertions are made by the Proposer.

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3.4.2 Dissemination of the Standard:

The Proposer will provide the INCITS Secretariat with a PDF file of the proposed standard for dissemination to the INCITS committee, INCITS Executive Board and for public review. The Proposer retains editorial rights until the proposed standard is approved as an American National Standard, at which time the document will be transferred in accordance with INCITS policies.

4 Related Standards Activities

4.1 Existing Standards:

ISO/IEC 14443 2-4, ISO 7816-4, ISO 15457, ISO 7810, ISO 13239, ISO 3166, ISO 8583, ISO 8601, ISO 10646, and INCITS B10.5 technical reports and pending standards documents.

4.2 Related Standards Activity:

ISO/IEC/JTC 1 SC17/WG8 projects for new and revised standards. Liaison to be made through routine B10 activities including: B10.1, B10.5 and B10.9.

4.3 Recommendations for Close Liaison:

Liaison has been established between B10.5 and B10.9 as necessary for support of the proposed standard.

5 Units of Measurement used in the Standard

5.1 Related measurements:

International Systems of Units (SI) and US (Inches).