

# Workshop Highlights:

## Mass. Integrated Transportation Payments Security and Privacy

[http://www.ecs.umass.edu/umass\\_itps\\_workshop/](http://www.ecs.umass.edu/umass_itps_workshop/)

**UMass President's Science & Technology Initiative**  
UMass Amherst + UMass Dartmouth

### Organizers:

- Prof. Wayne Burleson, Electrical Computer Engineering
- Prof. John Collura, Director, UMass Trans. Ctr., Civil & Env. Eng.
- Prof. Kevin Fu, Computer Science
- Dr. Andy Rupp, Electrical Computer Engineering
- Marguerite Zarrillo, Chair, Physics, UMass Dartmouth

MIT Transportation Bankcard Workshop, September 15, 2009

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# What's special about security?



# Correctness is easy.

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# Security is hard.



# National Academies on Transit Privacy

April 2008

TRANSIT CO-OPERATIVE RESEARCH PROGRAM  
Sponsored by the Federal Transit Administration

Subject Areas: IA Planning and Administration;  
IC Transportation Law; VI Public Transit

Responsible Senior Program Officer: Gwen Chisholm Smith

## Legal Research Digest 25

### PRIVACY ISSUES WITH THE USE OF SMART CARDS

This report was prepared under TCRP Project J-5, "Legal Aspects of Transit and Intermodal Transportation Programs," for which the Transportation Research Board is the agency coordinating the research. The report was prepared by Paul Stephen Dempsey, Tomlinson Professor of Law, McGill University, Montreal, Quebec, Canada. James B. McDaniel, TRB Counsel for Legal Research Projects, was the principal investigator and content editor.

#### The Problem and Its Solution

The nation's transit agencies need to have access to a program that can provide authoritatively researched, specific, limited-scope studies of legal issues and problems having national significance and application to their businesses. The TCRP Project J-5 is designed to provide this insight.

The intermodal approach to surface transportation requires a partnership between transit and other transportation modes.

Transit attorneys have noted that they particularly need information in several areas of transportation law, including environmental requirements; construction and procurement contract procedures and administration; civil rights and labor standards; and tort liability, risk management, and system safety.

In other areas of the law, transit programs may involve legal problems and issues that are not shared with other modes; as, for example, compliance with transit equipment and operations guidelines, Federal Transit Administration (FTA) financing initiatives, and labor or environmental standards.

#### Applications

Smart Cards are credit card-sized plastic cards that contain embedded technology enabling an electronic link between the card and the transit provider's reader equipment. The cards allow for a very fast transfer of information that transit providers need to collect their

fees. Using Smart Cards to replace traditional transit tickets or tokens reduces cash handling, equipment maintenance, and security costs. Smart Cards hold the promise of increasing convenience for riders, improving collection of ridership data, lending a more modern image to transit, and providing new opportunities for innovative fare structures and marketing.

In March 2000, TCRP published *Legal Research Digest 14: Treatment of Privacy Issues in the Public Transportation Industry*. TCRP LRD 14 contains a historic and general overview of privacy in the field of public transportation—examining privacy issues associated with employment, as well as those associated with customers of public transportation. It also noted the beneficial use of a Smart Card data collection system to transportation planners. Subsequent to this publication, particularly after the terrorist events of September 11, 2001, public consciousness regarding privacy as it relates to the use of Smart Cards changed. The plea for a higher level of security has supported the rapid growth in technological enhancements and uses of the Smart Card.

This digest examines basic privacy issues associated with the acquisition and storage of financial and trip data, including, but not limited to, who can access the data, what data may be accessed and under what conditions, and how the information can be used. As such, it should be useful to attorneys, administrators, human relations officers, security personnel, financial officers, and others.

TRANSPORTATION RESEARCH BOARD  
OF THE NATIONAL ACADEMIES

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"The **fundamental challenge** is to create a **security** regime that is highly effective in preventing...terrorism, but does **not unduly interfere** with the efficiency and productivity of transportation, impose excessive costs, create unwarranted passenger inconvenience, or intrude unnecessarily into **individual privacy and civil liberty.**"

# Who Spoke?

 <b>Massachusetts Bay Transportation Authority</b>	Rail, Subway, Bus & Ferry in the Boston Metro Area
	Logan Airport Parking Facilities
 <b>Massachusetts Turnpike Authority</b>	Big Dig, Mass. Turnpike, Fastlane
	Implementation and Distribution of Fare Collection Systems
 <b>ELECTRONIC FRONTIER FOUNDATION</b>	Digital Civil Liberties Advocacy Group
<b>Karsten Kohl</b>	U of Virg. Grad, Security Expert

# Breakout: Security Economics

## Security Costs:

1. Evolving compliance needs/maintenance costs
2. Media costs (e.g., Charlie card)
3. Service fees (e.g., credit card fees)
4. "Establishing policy" costs
5. Initial buy-in costs (subject to change with technology)
6. Visitors to system costs (easier if same people used system constantly)
7. Legacy media compliance (cash, magstipe)
8. Political costs (change in leaders)

# Breakout: Security Economics

Economic/Business Case Considerations:

1. Poorly understood end of life cycle for system
2. Integrated payments across agencies desirable, but no one size fits all solution
3. Credit card fees significant barrier
4. Not every passenger has a credit card

Optimal solution will require cooperation between agencies, credit card companies, and security companies

## Breakout: Privacy

Collecting passenger location information

- Important for operations, planning, stats, marketing

Data retention liability

- If you collect it, laws require you keep it
- **Myth:** Data mining incompatible w/ passenger privacy

Solutions:

- Require destruction/purge after use (not just re-ID)
- Laws effective against law-abiding organizations,  
**but not against insiders or intruders**

# Breakout: Privacy



The screenshot shows the MSNBC website interface. At the top left is the MSNBC logo. To its right is a search bar with the text "Powered by Bing" and a magnifying glass icon. Further right are links for "MSN Home" and "Me". Below the search bar are navigation links: "featuring TODAY", "Nightly News", "Dateline", and "Meet the Press".

The main content area is titled "Politics / Decision '08 archive". The primary headline is "Passport files of candidates breached" in large red font, with a sub-headline "Records of Clinton, McCain, Obama inappropriately accessed, officials say" in black. The article is attributed to "AP Associated Press" and is dated "updated 9:44 p.m. ET, Fri., March. 21, 2008". The text of the article reads: "WASHINGTON - State Department employees snooped through the passport files of three presidential candidates — Sens. **Barack Obama**, **Hillary Rodham Clinton** and **John McCain** — and the department's inspector general is investigating."

On the left side, there is a "Categories" menu with links to "U.S. news", "World news", "Politics", "Capitol Hill", "The White House", "More politics", "New York Times", "Chuck Todd", and "Howard Fineman".

On the right side, there is a "Video" section with a thumbnail image of a man in a suit speaking in front of a map of the United States.

## Breakout: Privacy Lessons

- Difficult to know when privacy violated
  - ▶ Latent effects (shows up much later)
  - ▶ Different passengers, different agencies have different privacy requirements
- Need transparency, above reproach
  - ▶ The public appreciates openness
- Borrow from HIPAA medical privacy model
  - ▶ Sophisticated attempt for de-identification
  - ▶ But far from perfect

# Breakout: Technology Questions

- Who controls and maintains the payment system?
- Crypto? Biometrics?
- New vulnerabilities?
- NFC phones as payment platform?
- Disposable vs. permanent?
  
- Increased read range for future contactless cards?
  - ▶ Passenger flow can improve
  - ▶ Handicapped access
  - ▶ Parking
- But fraud and privacy violations could increase
  - ▶ Exit accountability, tolls
  - ▶ Passengers more susceptible to location tracking

# Workshop on Integrated Payment Systems for Transportation

- Multi-disciplinary Team
  - Wayne Burleson (ECE) Director of TRENDS, Embedded Security, RFID
  - John Collura (CEE) Director of UMASS Transportation Center
  - Kevin Fu (Computer Science) Applied Cryptography, RFID
  - Marguerite Zarrillo, UMass Dartmouth, Toll Collection modeling
- Relevant Facilities
  - UMASS Ring Road Test Track (Collura)
  - RFID Lab (Fu and Burleson)
  - Transportation Simulation Laboratory (Zarrillo, UMass Dartmouth)
- Partners
  - Volpe National Transportation Systems Center, Cambridge, MA
  - RSA Labs (EMC security research group) , Bedford, MA
  - Intel Research, Seattle, WA
  - ThingMagic, Cambridge, MA
  - Massachusetts Executive Office of Transportation: Mass Highways, Mass Port, I95 Corridor Coalition.