UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	
Plaintiff	Civil Action No. _____
v.	
ZACK ANDERSON, RJ RYAN, ALESSANDRO CHIESA, and the MASSACHUSETTS INSTITUTE OF TECHNOLOGY	
Defendants	

COMPLAINT

Introduction

1.   The plaintiff, Massachusetts Bay Transportation Authority ("MBTA") brings this action against three undergraduate students at the Massachusetts Institute of Technology ("MIT"), and against MIT.

2.   As demonstrated below, the undergraduate students, Zack Anderson, RJ Ryan, and Alessandro Chiesa (collectively the "MIT Undergrads") (i) claim to have circumvented the security features of the MBTA's computerized CharlieTicket and CharlieCard fare media systems; (ii) publicly offered "free subway rides for life" to interested parties over the Internet; and (iii) plan to allow others to duplicate their claimed "breaking" of the Fare Media's security systems by presenting a paper, releasing software tools, and giving demonstrations at the DEFCON hackers convention this Sunday, August 10, in Las Vegas.

3.   Despite the MBTA's requests, MIT has been unwilling to set limits on the MIT Undergrads' activities.

4.   The MIT Undergrads have declined to provide the MBTA or its system vendors with information concerning the claimed security flaws in the system.

5.   If what the MIT Undergrads claim in their public announcements is true, public disclosure of the security flaws – before the MBTA and its system vendors have an opportunity to correct the flaws – will cause significant damage to the MBTA's transit system.

Parties

6.   The plaintiff, Massachusetts Bay Transportation Authority ("MBTA") is a legislatively created entity, under Massachusetts General Laws, Chapter 161A, with a principle place of business at the State Transportation Building, 10 Park Plaza, Boston, MA 02116.

7.   The defendant, Zack Anderson ("Anderson"), upon information and belief, is an electrical engineering and computer science undergraduate studying at MIT, with a residential address of East Campus, 3 Ames St., Hall 2W, Room W210, Cambridge, Massachusetts 02142.

8.   The defendant, RJ Ryan ("Ryan"), upon information and belief, is an undergraduate researcher in computer security at MIT, with a residential address of East Campus, 3 Ames St., Hall 2W, Room W214 Cambridge, Massachusetts 02142.

9.   The defendant, Alessandro Chiesa ("Chiesa") upon information and belief, is a junior majoring in Theoretical Mathematics and Electrical Engineering and Computer Science at MIT, with a residential address of East Campus, 3 Ames St., Hall 4W, Room 409, Cambridge, Massachusetts 02142.

10.   The defendant, Massachusetts Institute of Technology ("MIT"), is a Massachusetts non-profit educational institution having a usual place of business at 77 Massachusetts Avenue, Cambridge, Massachusetts 02139.

11.   The term "MIT Undergrads" is used to refer to Anderson, Ryan, and Chiesa.

Jurisdiction And Venue

12.   This Court has subject matter jurisdiction over the MBTA's claims under the

provisions of 18 U.S.C. §1030(g) and 28 U.S.C. § 1331.

13.   This Court has supplemental jurisdiction over MBTA's state, statutory and

common law claims under 28 U.S. C. § 1367(a), because these claims are so related to the

federal claims in this action that they form part of the same case or controversy.

14.   Venue is appropriate in this District pursuant to 28 U.S.C. §§ 1391(b).

Factual Allegations Common To All Counts

The MBTA's Transit System

15.   The MBTA is the nation's 5th largest mass transit system. The MBTA serves a

population of 4,667,555 (based on the 2000 census) in 175 cities and towns with an area of 3,244

square miles.

16.   To provide these transit services, the MBTA maintains 183 bus routes, 2 of which

are Bus Rapid Transit lines, 3 rapid transit lines, 5 streetcar (Central Subway/Green Line) routes,

4 trackless trolley lines and 13 commuter rail routes. The MBTA's transit equipment includes of

927 diesel and CNG buses, 32 dual mode buses, 28 ETB′s (electric trolley buses), 408 heavy rail

vehicles, 200 light rail vehicles, 10 PCC's streetcars, 83 commuter rail locomotives, 410

commuter rail coaches and 298 MBTA-owned specially equipped vans and sedans, and an

additional 235 contractor-supplied specially equipped vans and sedans.

17.   The average weekday ridership for the entire system is approximately 1.4 million

passenger trips. The approximate average weekday revenue of the MBTA is $700,000.00.

18.   The MBTA directly services Rhode Island as well as Massachusetts, via its

commuter rail service.

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19.   The MBTA is the recipient of significant funding from the United States Department of Transportation, through the Urban Mass Transportation Administration ("UMTA"). Since the mid-1960's, the MBTA has received over $3.5 billion in such funding, for its capital improvement projects and its yearly operating programs.

20.   In addition to this funding, the MBTA receives funds from the Department of Homeland Security, to implement various security, anti-terrorism, and other security initiatives. For example, in 2007 the MBTA received $4 million from the Department of Homeland Security and the Federal Transit Administration, for use in emergency communications initiatives.

**The MBTA Undertakes Considerable Improvements To The System,
Including The Introduction of An Automated Fare Collection System**

21.   The MBTA has recently undertaken significant system improvements. A central improvement consisted of the procurement and installation of an automated fare collection system (the "Automated Fare Collection System" or "AFC System"). The Automated Fare Collection System replaces the MBTA's old "token" system, and is comprised of the following general, high-level system components:

      (a)   Computerized fare gates in each station, that read fare media and permit (or deny) users access to MBTA transit services ("Fare Gates");

      (b)   Computerized fare vending machines in each station (and elsewhere), that accept payment and issue or load value to fare media ("Fare Vending Machines");

      (c)   Fare media that communicate with the Fare Gates and the Fare Vending Machines to store and transfer "value" – the equivalent of the old token -- and that allow paying patrons to access the MBTA's transit services ("Fare Media");

      (d)   A central computing facility that controls and exchanges data with Fare Gates, with Fare Vending Machines, with servers and other devices connected to the AFC System network, with remote retail sales outlets, and with dial-in and other connections to the AFC System; and

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(e)   Complex sets of software applications that are resident on servers at the central computing facility, on the Fare Gates, on the Fare Vending Machines, and on certain Fare Media. These software applications (among other tasks) manage and control the issuance of fare media, payments for transit services, rate schedules, ridership volumes, and a wide range of other tasks and information.

22.   The AFC System, accordingly, is highly automated, and is comprised of high speed data processing devices that perform logical, arithmetic, and storage functions.

23.   The procurement and installation of the Automated Fare Collection System cost in excess of $180 million.

Through Outside Vendors, The MBTA Implements Its "CharlieCard pass" and "CharlieTicket pass" System

24.   Fare Media are broken into two categories: (i) so-called "CharlieCard" passes and (ii) so-called "CharlieTicket passes". These Fare Media each employ slightly different technology.

25.   A CharlieTicket pass uses a so-called a "magnetic stripe" or "magstrip" to convey information to the Automated Fare Collection System. CharlieTicket passes are paper-based media, and to employ a CharlieTicket pass, a user brings the Ticket's magstrip into physical contact with a reader in fare gate, by "swiping" the Ticket past the designated reading head. A user can "store value" on his or her CharlieTicket pass, or can store a monthly pass (or other pass) on the CharlieTicket pass.

26.   CharlieCard passes, in contrast, are plastic media, and are so-called "smart cards." Each CharlieCard pass contains an integrated circuit – a computer chip – that processes information. This chip allows a user to store value for single or multiple rides and/or a T-pass. In addition, the smart card features of the CharlieCard pass allow for online account management, and other services that are not compatible with the CharlieTicket pass technology.

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27.   The user loads a CharlieTicket pass or a CharlieCard pass with value or a T-Pass using cash, credit or debit cards, at in-station fare vending machines, at retail sales terminals, at MBTA ticket offices, or online via the MBTA's website at www.mbta.com.

The CharlieCard Pass Becomes Centrally Important To The MBTA's Overall Transit System

28.   The MBTA has implemented both CharlieTicket passes and CharlieCard passes in its Automated Fare Collection System. CharlieCard passes, for example, began to be used in January 2007.

29.   The CharlieCard has become the preferred fare media of MBTA riders.

30.   Currently, over eighty percent (68%) of riders use the CharlieCard pass, with ninety percent (90%) receiving the best value by using monthly magnetic stripe cards and CharlieCards. Accordingly, CharlieCards account for approximately $475,000.00 per weekday in revenues.

31.   The CharlieCard is employed in the MBTA's corporate pass program, whereby employers provide MBTA fare media to their employees. As of the spring of 2008, this program had grown to include over 1,300 companies with offices in the Boston area.

32.   Although CharlieCards are not currently employed on the MBTA's commuter rail system, a pilot program for such use is scheduled to commence in 2009.

The MBTA Learns That The MIT Undergrads (i) Purport To Have Discovered Security Flaws In The MBTA's CharlieTicket And CharlieCard Systems And (ii) Have Publicly Promised To Provide Others With "Free Subway Rides For Life"

33.   On July 30, a vendor responsible for components of the Automated Fare Collection System notified the MBTA of its discovery of an Internet posting that advertised a presentation at the upcoming DEFCON 16 "hacking" conference.

34.   The Internet posting read, in relevant part, as follows:

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> Anatomy of a Subway Hack: Breaking Crypto RFID's and Magstripes of Ticketing Systems
>
> Zack Anderson Student, MIT
> RJ Ryan Student, MIT
> Alessandro Chiesa Student, MIT
>
> Want free subway rides for life? In this talk we go over weaknesses in common subway fare collection systems. We focus on the Boston T subway, and show how we reverse engineered the data on magstripe card, we present several attacks to completely break the CharlieCard, a MIFARE Classic smartcard used in many subways around the world, and we discuss physical security problems. We will discuss practical brute force attacks using FPGAs and how to use software-radio to read RFID cards. We go over social engineering attacks we executed on employees, and we present a novel new method of hacking WiFi: WARCARTING. We will release several open source tools we wrote to perform these attacks. With live demos, we will demonstrate how we broke these systems.

35.   The three MIT students identified in this announcement (for convenience, the "Initial Announcement") are the MIT Undergrads who are defendants in this matter. .

36.   This Initial Announcement raised a number of concerns.

37.   First, the Initial Announcement specifically targets the MBTA and its computerized Fare Media systems. The Announcement reads, for example: "[w]e focus *on the Boston T subway*, and show how we reverse engineered the data on *magstripe card* [apparently referring to the CharlieTicket], we present several attacks to completely break *the CharlieCard.*" (emphasis added).

38.   Second, the Initial Announcement suggests that the MIT Undergrads have wholly compromised the CharlieCard system. The Announcement states, for example, that " we present several attacks to *completely break* the CharlieCard." (emphasis added)

39.   Third, in the Initial Announcement, the MIT Undergrads promise to provide to attendees at their presentation "*free subway rides for life*." (emphasis added).

40.   Fourth, the Initial Announcement advertises the connection between the authors and MIT. This use of the MIT name suggests an endorsement or other approval of the presentation.

41.   Finally, the MIT Undergrads claim that they will provide software tools to allow others to "break" the MBTA's CharlieCard and CharlieTicket system. Specifically, the Initial Announcement states that "[w]e will release *several open source tools* we wrote to perform these attacks. With live demos, *we will demonstrate how we broke these systems*."

42.   Accordingly, the MIT Undergrads promised, in the Initial Announcement, to instruct and enable others to "break" the MBTA's computerized Fare Media system.

43.   The Initial Announcement presented concerns, in addition, due to the forum the MIT Undergrads had chosen. The Announcement indicated that the MIT Undergrads would present this information at DEFCON 16.

44.   According to information published by DEFCON, the DEFCON Conference, taking place this year at the Riviera Hotel & Casino in Las Vegas, Nevada, is "one of the oldest continuous hacker conventions around, and also one of the largest. *See* https://www.defcon.org/html/links/dc-faq/dc-faq.html.

45.   Organizers state that the Conference is anticipated to draw 5,000 to 7,000 attendees.

46.   According to organizers, "technology and hacking is the core" of the Conference. *See id.*

47.   The 2008 DEFCON Conference begins on Friday, August 8, and the MIT Undergrads are scheduled to give their "The Anatomy of a Subway Hack" presentation at 1:00 on Sunday, August 10, 2008.

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**The MBTA Contacts The MIT Undergrads, Through Law Enforcement,
And Communicates Its Concerns To Them, To Professor Rivest, And To
MIT**

48.   After discovering the Initial Announcement and the threat it posed, the MBTA

and law enforcement promptly arranged a meeting with the MIT Undergrads to discuss their

intentions, and to present the MBTA's concerns.

49.   This meeting took place on August 5, 2008. The MIT Undergrads attended, as

did Rivest and MIT counsel.

50.   The MIT Undergrads stated that they did not intend to harm the MBTA.

51.   Despite this statement, and the MBTA's requests, the defendants have not

provided the MBTA with a copy of the materials the MIT Undergrads plan to present.

52.   After this August 5 meeting, the Initial Announcement was revised to read in

relevant part as follows (for convenience, the "Revised Announcement"):

> The Anatomy of a Subway Hack:
> Breaking Crypto RFID's and Magstripes of Ticketing Systems
>
> Zack Anderson Student, MIT
> RJ Ryan Student, MIT
> Alessandro Chiesa Student, MIT
>
> In this talk we go over weaknesses in common subway fare collection
> systems. We focus on the Boston T subway, and show how we reverse
> engineered the data on magstripe card, we present several attacks to
> completely break the CharlieCard, a MIFARE Classic smartcard used in
> many subways around the world, and we discuss physical security
> problems. We will discuss practical brute force attacks using FPGAs and
> how to use software-radio to read RFID cards. We survey 'human
> factors' that lead to weaknesses in the system, and we present a novel
> new method of hacking WiFi: WARCARTING. We will release several
> open source tools we wrote in the process of researching these attacks.
> With live demos, we will demonstrate how we broke these systems.

53.   A comparison of (a) the Initial Announcement to (b) the Revised Announcement

reveals the following changes (underlines signify additions, strike-outs signify deletions from

the):

> ~~Want free subway rides for life?~~ In this talk we go over weaknesses in common subway fare collection systems. We focus on the Boston T subway, and show how we reverse engineered the data on magstripe card, we present several attacks to completely break the CharlieCard, a MIFARE Classic smartcard used in many subways around the world, and we discuss physical security problems. We will discuss practical brute force attacks using FPGAs and how to use software-radio to read RFID cards. We ~~go over social engineering attacks we executed on employees~~ survey 'human factors' that lead to weaknesses in the system, and we present a novel new method of hacking WiFi: WARCARTING. We will release several open source tools we wrote ~~to perform~~ in the process of researching these attacks. With live demos, we will demonstrate how we broke these systems.

54.   The Revised Announcement does not remove the MBTA's concerns.

55.   Like the Initial Announcement, the Revised Announcement (i) targets the MBTA

and its specific Fare Media systems by name; (ii) claims that the CharlieCard system has been

"completely" broken by the authors' attacks; (iii) continues to suggest endorsement and approval

by MIT; and (iv) continues to promise the release of software tools and demonstrations to allow

others to duplicate the attacks.

56.   Disclosure of this information – if what the MIT Undergrads claim is true – will

significantly compromise the CharlieCard and CharlieTicket systems. This in turn will harm the

overall functioning of the MBTA's transit services.

57.   The MBTA does not demand that the MIT Undergrads forever refrain from

disclosing information that will compromise or threaten to compromise the security of its Fare

Media systems. Instead, under industry-accepted principles of "responsible disclosure", the

MBTA demands that the MIT Undergrads refrain from such disclosure until the MBTA's system

vendors have remedied the security flaw the MIT Undergrads have identified.

The Role of MIT

58.   Professor Rivest specializes in cryptography; computer and network security; and

algorithms. Professor Rivest, on information and belief, is an inventor of the RSA public-key

cryptosystem, and a founder of RSA Data Security.

59.   Upon information and belief, Rivest was aware of, and supervised the MIT

Undergrads in their work attacking and "breaking" the MBTA's Fare Media system.

60.   MIT publishes explicit policies prohibiting attacks on the security and integrity of

MIT systems. For example, the MITnet Rules of Use provide as follows:

> Don't violate the intended use of MITnet.
> The purpose of MITnet is to support research, education, and MIT
> administrative activities, by providing access to computing resources and
> the opportunity for collaborative work. All use of the MIT network must
> be consistent with this purpose. For example:
>
> Don't try to interfere with or alter the integrity of the system at large, by
> doing any of the following:
> …
> attempting to capture or crack passwords or encryption
> destroying or altering data or programs belonging to other users
> …
> Appropriate use of MITnet resources includes maintaining the security
> of the system. *See* http://web.mit.edu/olh/Rules/#rule_1

61.   Rivest and MIT are bound to respect and enforce these rules with respect to MIT's

own network security. Upon information and belief, the MIT Undergrads have been permitted to

disregard these rules with respect to key systems in the Commonwealth, such as the MBTA's

computerized Fare Media systems.

62.   The defendants' actions and omissions have caused the MBTA to expend

substantial funds to respond to the threat the defendants have posed. Due to the defendants'

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failure to provide information reasonably requested by the MBTA, the MBTA is unaware

currently of the level of improper ridership due to the defendants' wrongdoing. This

wrongdoing, if allowed to continue -- and if what the MIT Undergrads claim is true -- threatens

to inflict significant additional damage, unless the requested relief is granted.

Count I
Violation Of The Computer Fraud And Abuse Act: 18 U.S.C. §1030

63.   MBTA restates and re-alleges the allegations contained in Paragraphs 1 through

62 as if fully set forth herein.

64.   A CharlieTicket standing alone constitutes a "computer" within the meaning of 18

U.S.C. §1030(e)(1).

65.   A CharlieCard standing alone constitutes a "computer" within the meaning of 18

U.S.C. §1030(e)(1).

66.   The system for storing value and processing payments via CharlieTickets and

CharlieCards, including the Fare Gate and the Fare Vending Machine, constitutes a "computer"

within the meaning of 18 U.S.C. §1030(e)(1).

67.   The "computers" identified above were used in interstate commerce or

communication and were protected computers within the meaning of 18 U.S.C. §1030(e)(2)(B).

68.   The MIT Undergrads knowingly caused the transmission of a program,

information, code, or command targeted at MBTA protected computers.

69.   As a result of such conduct, the MIT Undergrads intentionally caused damage

without authorization, to these protected computers.

70.   The MIT Undergrads intentionally accessed MBTA protected computers without

authorization, and as a result of such conduct, have caused damage.

71. The damage caused includes a loss aggregating substantially more than the $5,000 amount required under 18 U.S.C. §1030(a)(5)(B)(i).

72. In addition, the damage constitutes a threat to public health or safety, within the meaning of 18 U.S.C. §1030(a)(5)(B)(iv).

73. The damage, moreover, affects a computer system used by a government entity for national security purposes, within the meaning of 18 U.S.C. §1030(a)(5)(B)(v).

74. The MBTA has been damaged, and has suffered losses, due to these past wrongs by the defendants.

75. More importantly, the MBTA will suffer irreparable harm if the MIT Undergrads are allowed to give their presentation at DEFCON without limitations, based on the Initial and Revised Announcements.

Count II
Liability for Attempt under 18 U.S.C. §1030

76. MBTA restates and re-alleges the allegations contained in Paragraphs 1 through 75 as if fully set forth herein.

77. The conduct described above, if it does not rise to the level of a direct violation of 18 U.S.C. §1030, at a minimum constitutes an illegal attempt, actionable under the statute.

78. In light of this attempt, the MBTA will suffer irreparable harm if the MIT Undergrads are allowed to give their presentation at DEFCON without limitations, based on the Initial and Revised Announcements.

Count III
Conversion

79. MBTA restates and re-alleges all of the allegations contained in Paragraphs 1 through 62 as if fully set forth herein.

80.   MBTA owns and has immediate right to possession of fares from passengers traveling on the MBTA lines.

81.   The MIT Undergrads exerted dominion over MBTA's property by traveling on the MBTA lines without paying fares.

82.   The MIT Undergrads have no right to enjoy the MBTA's transit services without paying requisite fares.

83.   By engaging in the conduct described above, the MIT Undergrads have converted the MBTA's property.

84.   Upon information and belief, the MIT Undergrads have instructed others in converting, have provided the means to allow others to convert, or have otherwise facilitated the conversion by others of the MBTA's property.

85.   As a result, the MBTA has suffered damages.

Count IV
Trespass To Chattels

86.   MBTA restates and re-alleges all of the allegations contained in Paragraphs 1 through 62 as if fully set forth herein.

87.   The MBTA consented to the MIT Undergrads' use of, and access to, its computerized Fare Media systems, including CharlieTickets and CharlieCards.

88.   By the conduct described herein, these defendants knowingly and intentionally exceeded that consent, and have trespassed on the MBTA's computing facilities.

89.   The MBTA has been damaged as a result of these defendants' trespass. .

Count V
For Imposition Of A Constructive Trust Upon Illegal Profits

90.   MBTA restates and re-alleges all of the allegations contained in Paragraphs 1 through 62 as if fully set forth herein.

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91.   The MIT Undergrads' conduct is wrongful.

92.   By virtue of these defendants' wrongful conduct, they have illegally received or will illegally receive money and profits that rightfully belong to MBTA, in the form of lost transit fares.

93.   MBTA is entitled to have the MIT Undergrads hold the money and profits that they illegally received as constructive trustee for the benefit of MBTA.

Count VI
Negligent Supervision Against MIT

94.   The MBTA restates and re-alleges all of the allegations contained in Paragraphs 1 through 62 as if fully set forth herein.

95.   Based on MIT's policies, industry practice, and other sources, MIT understood the importance of network integrity and security.

96.   MIT owed a duty to the MBTA to properly supervise and guide the MIT Undergraduates.

97.   This duty included a duty to instruct and guide the MIT Undergraduates to responsibly disclose information concerning perceived security flaws.

98.   MIT knew or should have know of the MIT Undergrads' activities evidenced by the Initial and Revised Announcements. MIT knew or should have know of the MIT Undergrad's decision to decline to provide the MBTA with any written information concerning their presentation.

99.   Harm to the MBTA was foreseeable by MIT in the event MIT failed to fulfill these duties.

100.   MIT breached these duties.

101.   This breach has caused the MBTA significant harm.

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COUNT VII
Violations of M.G.L. c. 93, §11

102.   The MBTA restates and re-alleges all of the allegations contained in Paragraphs 1 through 62 as if fully set forth herein.

103.   Each of the defendants is engaged in trade or commerce in the Commonwealth of Massachusetts.

104.   The actions of the defendants, as aforesaid, constitute unfair and deceptive acts and practices in violation of G.L. c. 93A, §11.

Requested Relief

WHEREFORE, the MBTA respectfully requests that the Court:

1.   Grant it Judgment in an amount to be set at trial on Counts I through VI;

2.   Grant it Judgment in an amount to be set at trial on Count VII, trebled, plus costs and attorneys' fees;

3.   Grant preliminary injunctive relief, pursuant to 18 U.S.C. §1030(g) and extending through DEFCON and until the MBTA's vendors have had sufficient time to correct defects, enjoining the MIT Undergrads:

(a)   From offering to provide software tools or demonstrations to allow others to duplicate the attacks referenced in the Initial and Revised Announcements;

(b)   From providing information or materials that would assist another in any material way to circumvent the security of the Fare Media system;

(c)   From publicly stating or indicating that the security or integrity of the CharlieCard pass, the CharlieTicket pass, or the MBTA's Fare Media systems has been compromised;

(d)   From further circulating the Initial Announcement and Revised Announcement, and from declining to promptly remove access to these Announcements;

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(e)   From suggesting that MIT endorses or approves of the activities outlined in the Initial or Revised Announcement;

(f)   From suggesting they can provide or assist others in obtaining "free subway rides" on the MBTA's transit system; and

(g)   From declining to provide the MBTA and its vendors with information sufficient to replicate, test, and repair the purported security flaws in the Fare Media system.

4.   Enter an order declaring that the MIT Undergrads hold in trust, as constructive trustees for the benefit of MBTA, any revenues obtained from the use of compromised Fare Media;

5.   Award the MBTA its costs, including attorneys' fees; and

6.   Grant the MBTA such other relief as is just and proper.

MASSACHUSETTS BAY TRANSPORTATION
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By its attorneys,

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Dated: August __, 2008
       Boston, Massachusetts

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