

# Securing Digital Democracy

## Lecture 8 | *Internet Voting?*

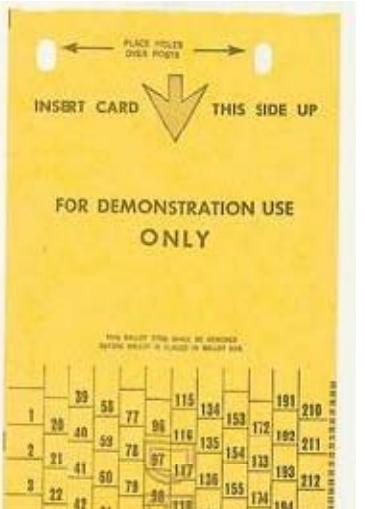
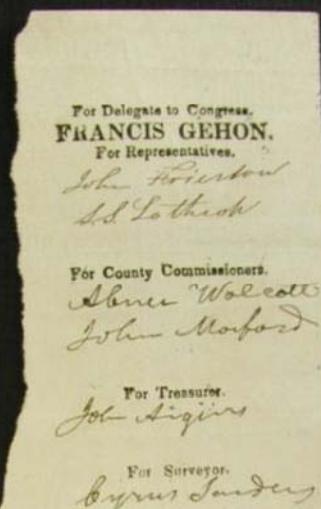
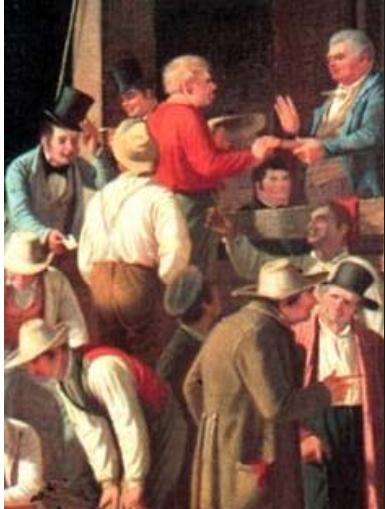


J. Alex Halderman  
University of Michigan

# A Bad Idea

## 8.1 A Bad Idea

## Securing Digital Democracy

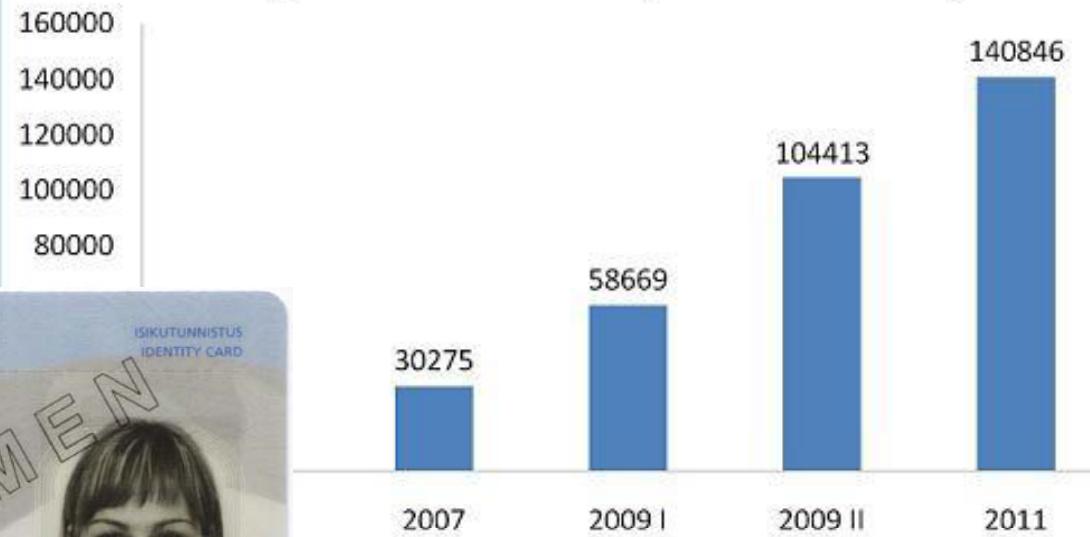


## 8.1 A Bad Idea

### Estonia



E-voting in Estonia 2005-2011 (number of e-voters)



Limited use: Canada, France, Switzerland, U.K., U.S.

Graph source: <http://www.ega.ee/node/835>

## Pilot Projects in the U.S.



Limited to overseas  
absentee voters.



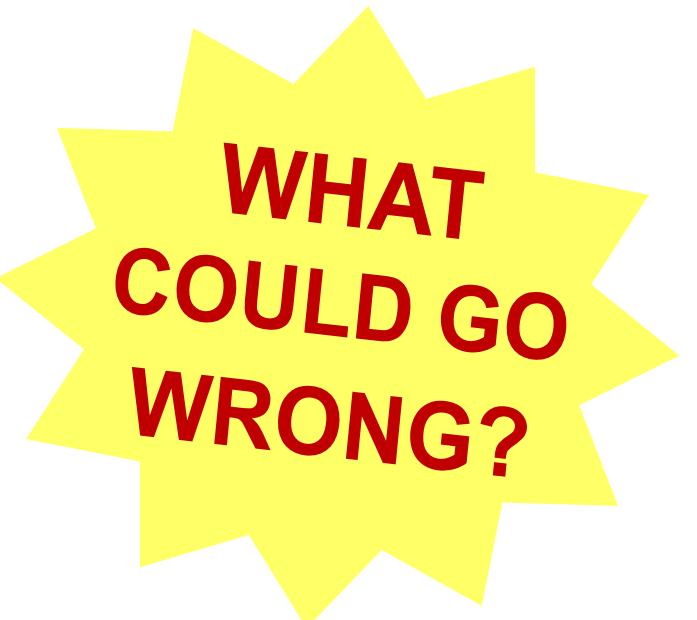
## Potential Attackers?

Traditional Fraudsters

Online Fraudsters

“Hacktivists”

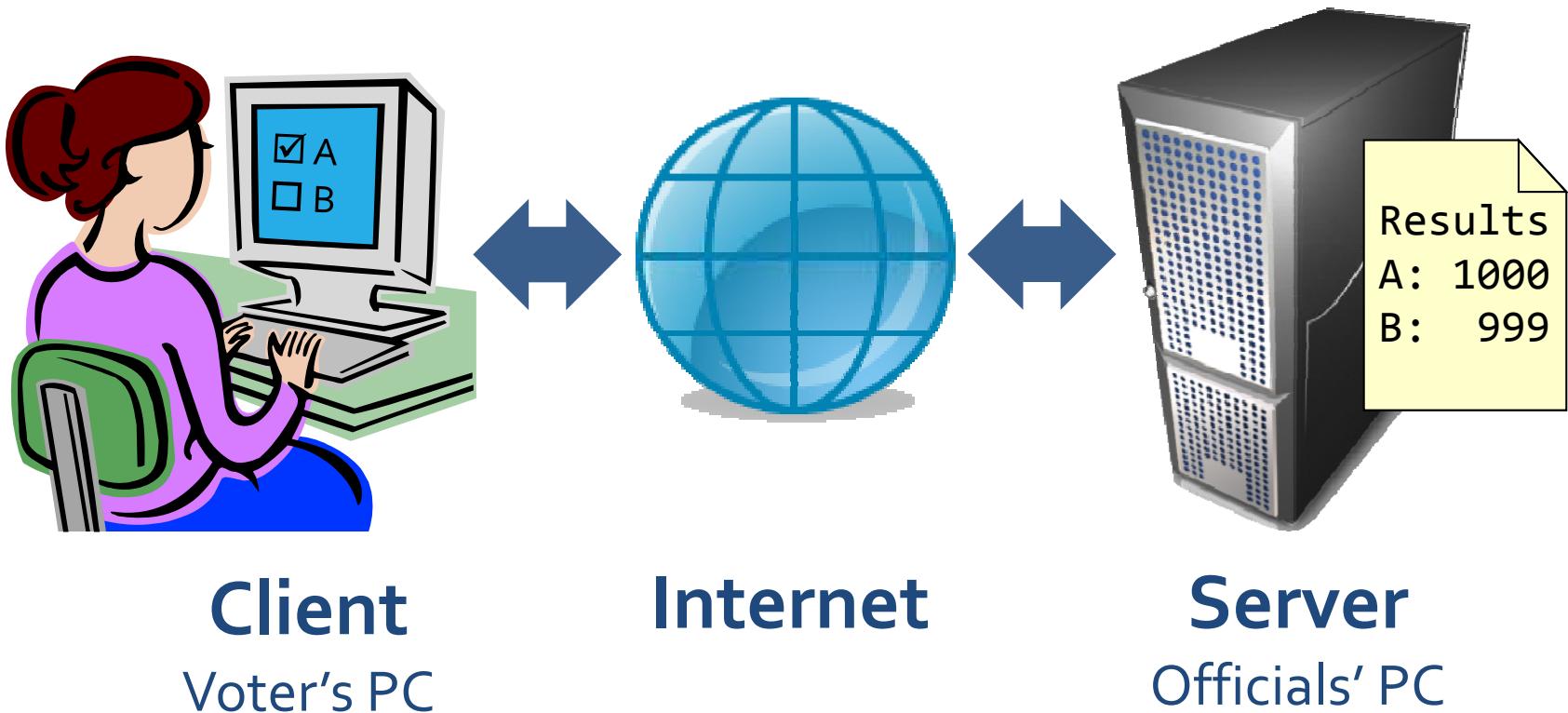
Foreign States

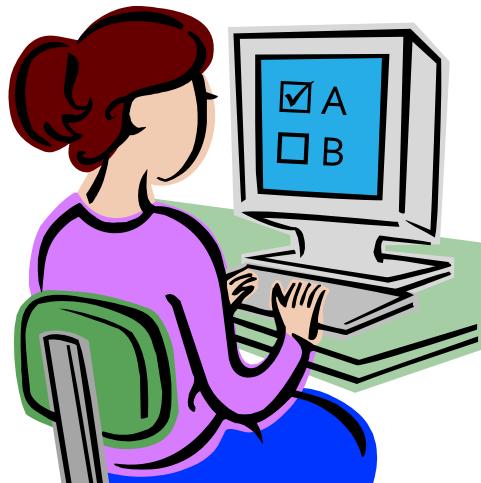


**WHAT  
COULD GO  
WRONG?**

# Client-side Threats

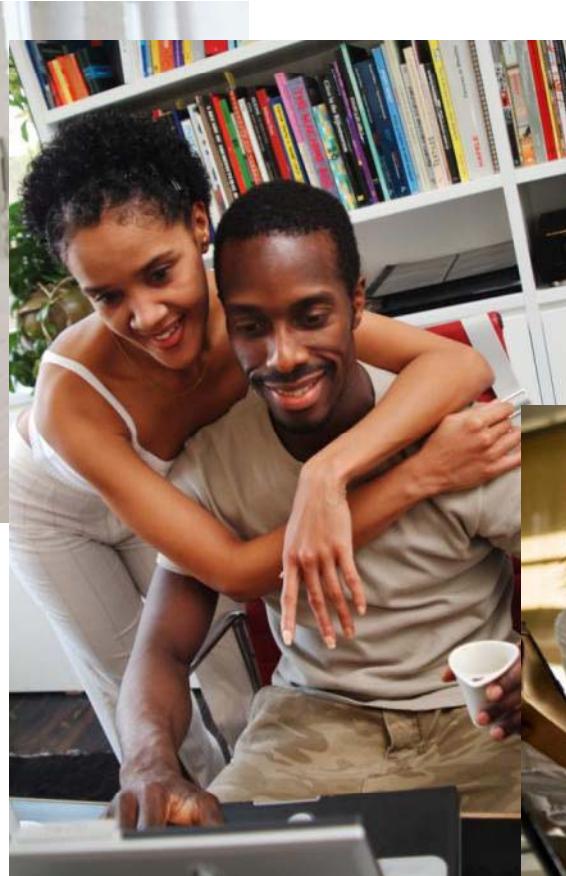
## 8.1 A Bad Idea

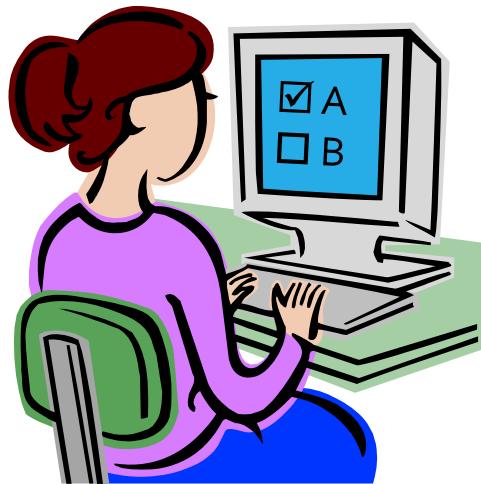




Coercion

## 8.2 Client-side Threats





Coercion

Credential Theft



Dear valued customer of TrustedBank,

We have received notice that you have recently attempted to withdraw the following amount from your checking account while in another country: \$135.25.

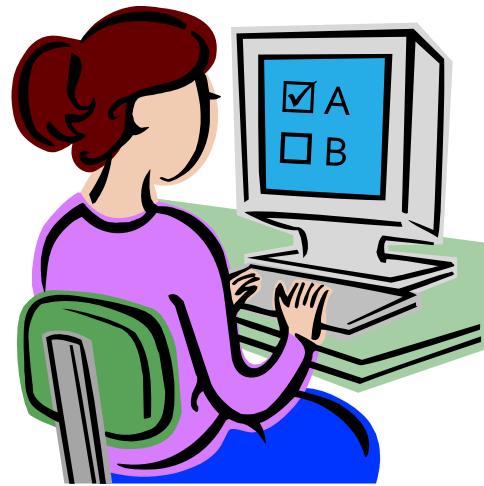
If this information is not correct, someone unknown may have access to your account. As a safety measure, please visit our website via the link below to verify your personal information:

<http://www.trustedbank.com/general/custverifyinfo.asp>

Once you have done this, our fraud department will work to resolve this discrepancy. We are happy you have chosen us to do business with.

Thank you,  
TrustedBank

Member FDIC © 2005 TrustedBank, Inc.



Coercion

Credential Theft

Imposter Sites

## 8.2 Client-side Threats

Hi, Guest | Sign In | Help

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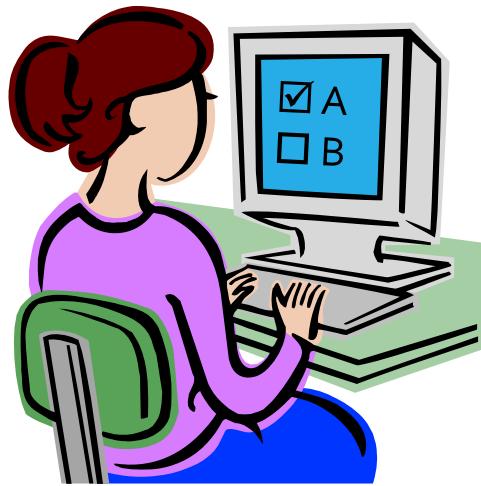
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<http://www.hyphenet.com/blog/2011/09/19/adobe-flash-player-paid-ads-on-yahoo-bing-link-to-malware-again/>



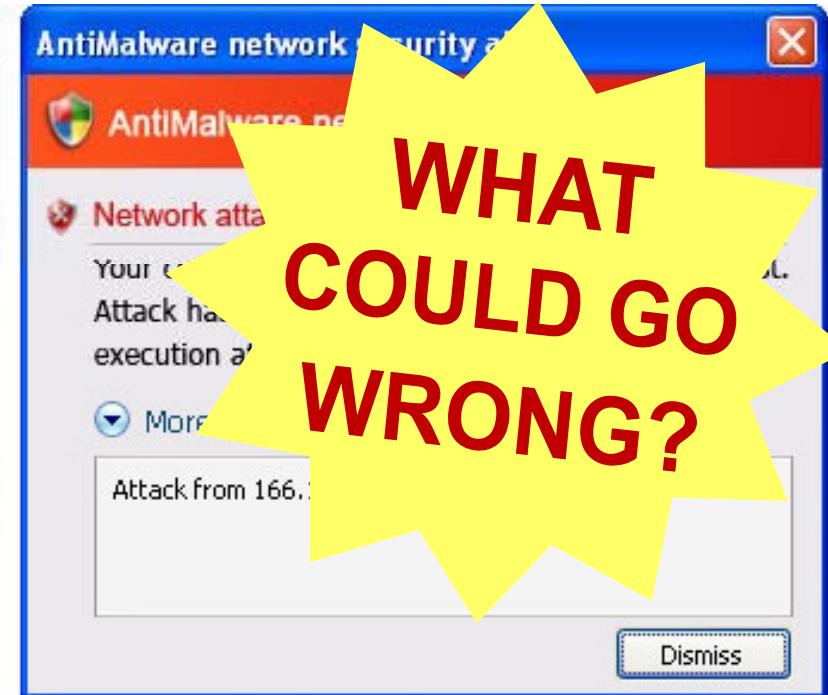
Coercion

Credential Theft

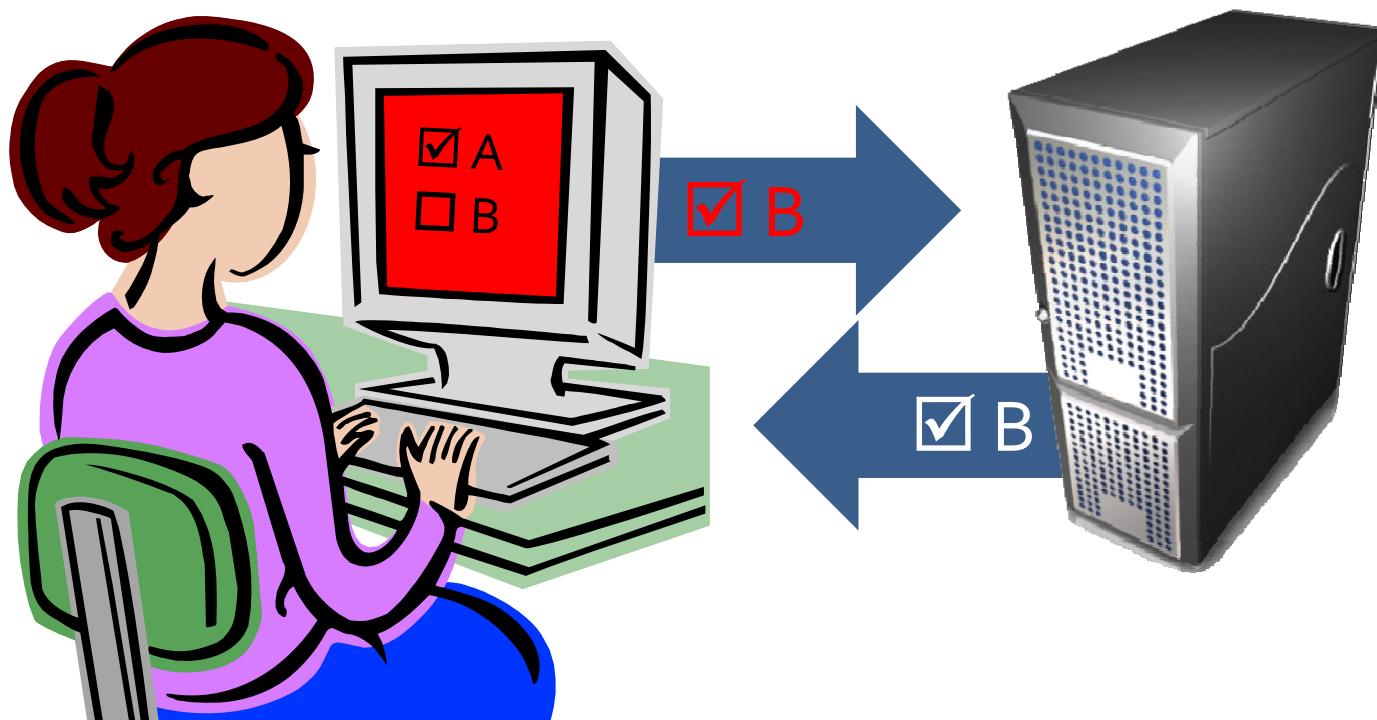
Imposter Sites

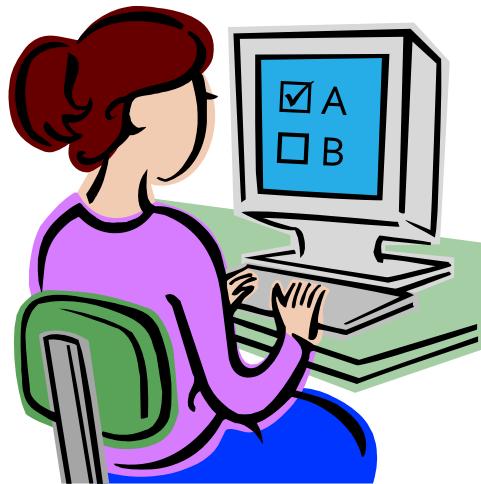
Malware

## 8.2 Client-side Threats



## 8.2 Client-side Threats





**Coercion**

**Credential Theft**

**Imposter Sites**

**Malware**

**Botnets**

# Botnets

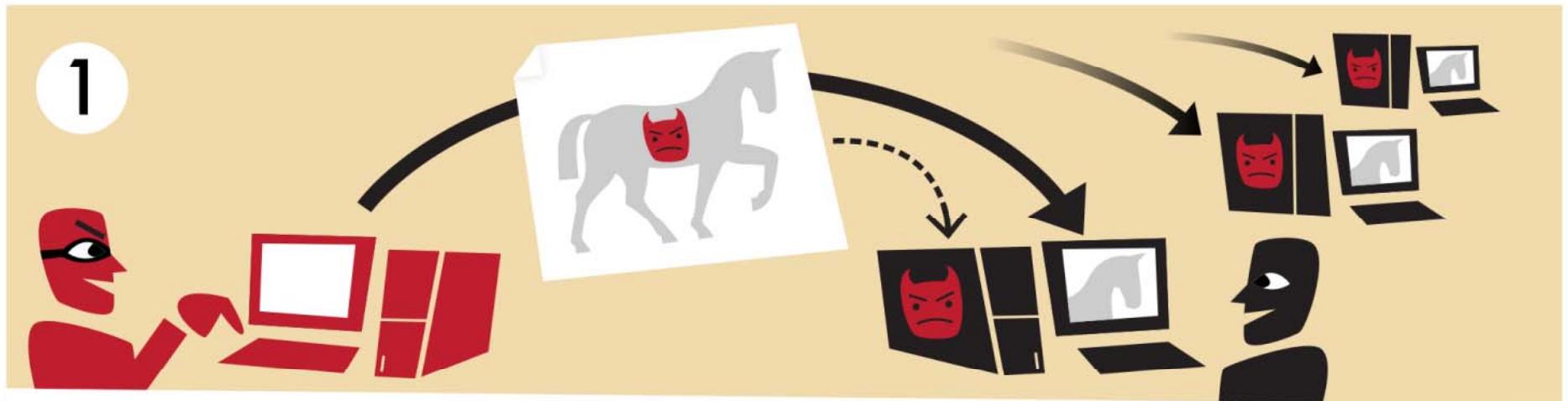


Illustration by Tom-b via Wikimedia Commons, <http://en.wikipedia.org/wiki/File:Botnet.svg>  
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# Botnets



Illustration by Tom-b via Wikimedia Commons, <http://en.wikipedia.org/wiki/File:Botnet.svg>  
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# Botnets

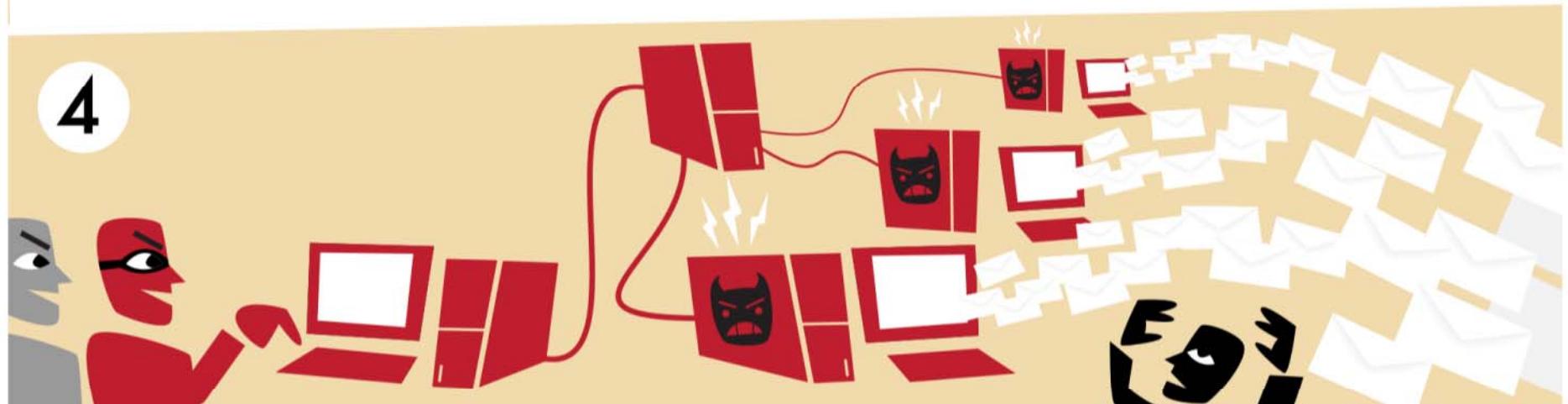
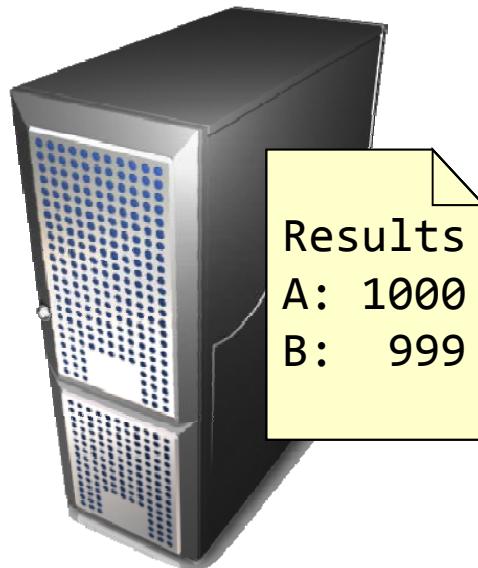


Illustration by Tom-b via Wikimedia Commons, <http://en.wikipedia.org/wiki/File:Botnet.svg>  
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# Server-side Threats



Denial of Service

# Distributed Denial-of-Service (DDoS) Attack

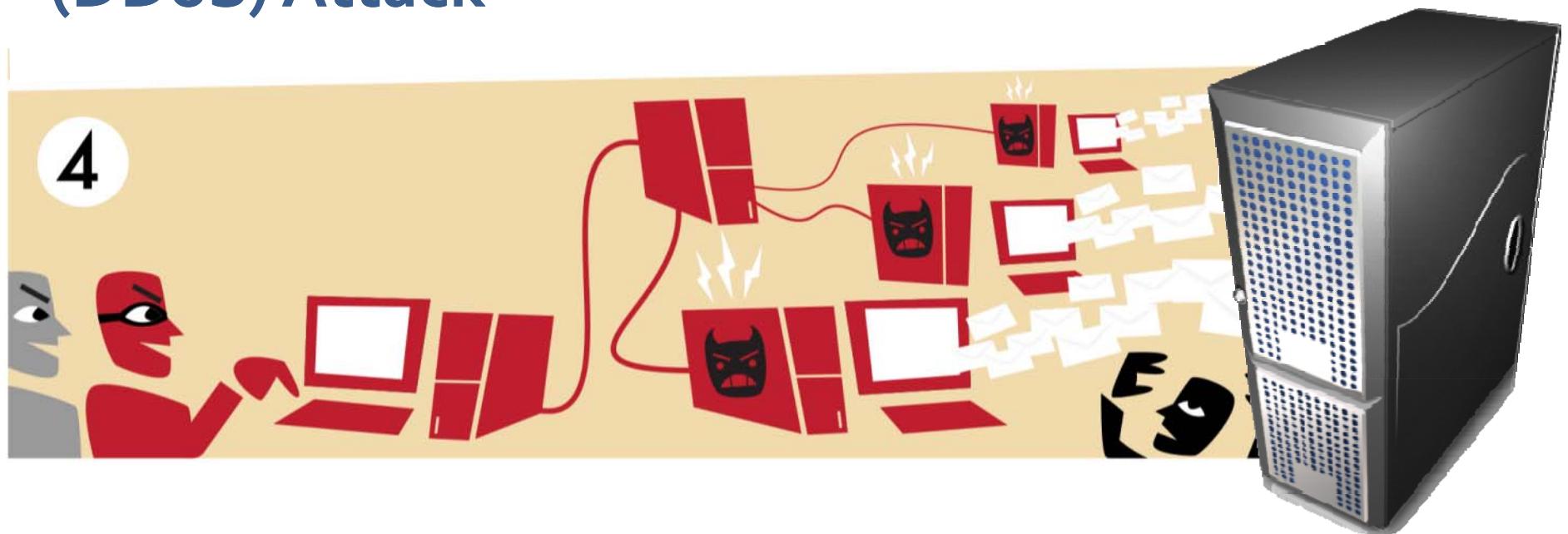
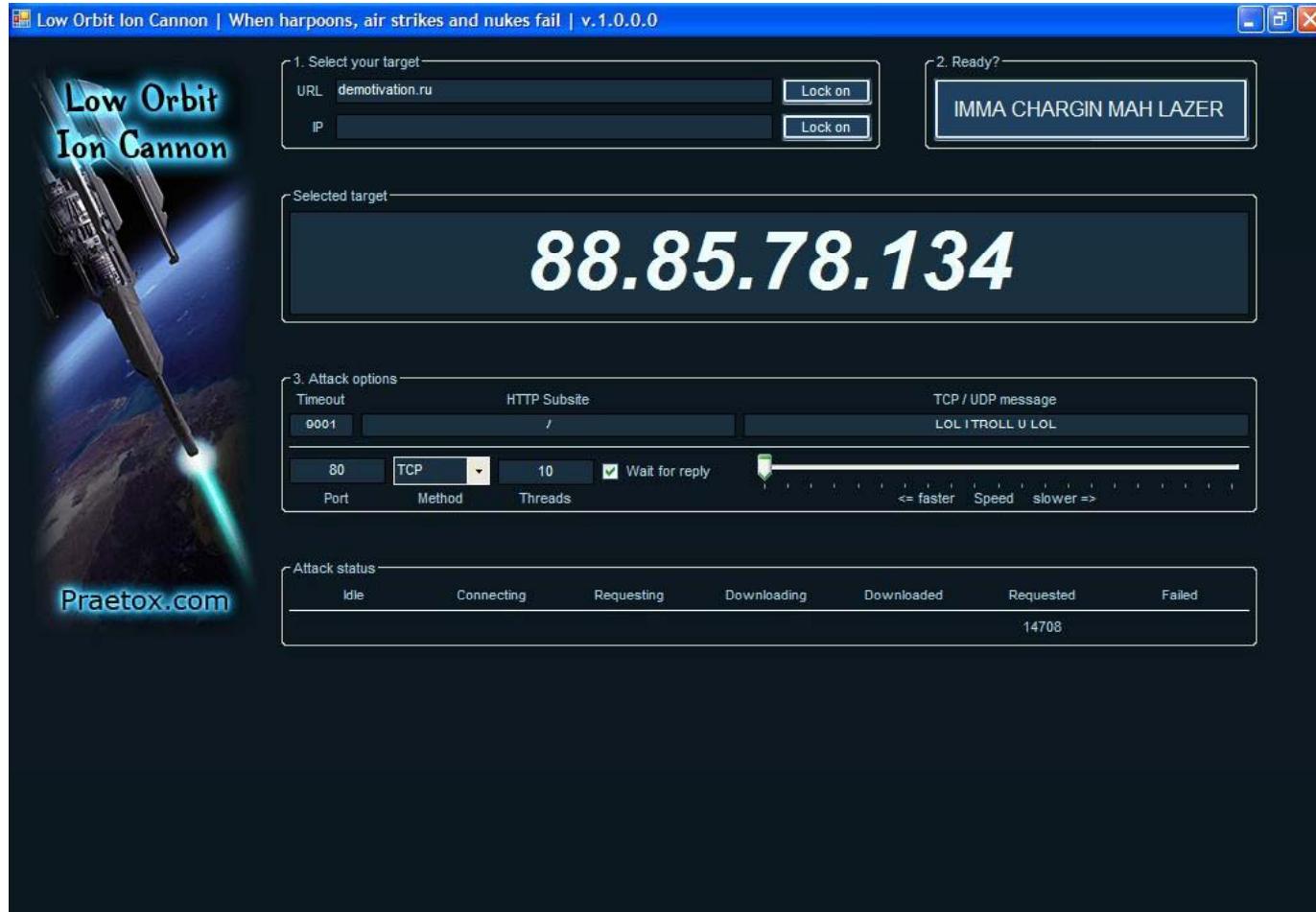
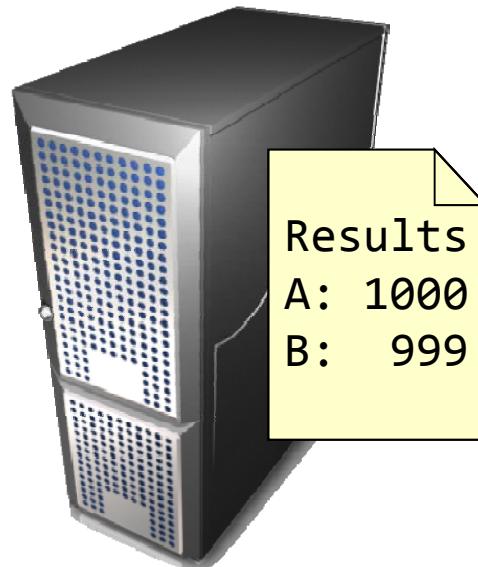


Illustration by Tom-b via Wikimedia Commons, <http://en.wikipedia.org/wiki/File:Botnet.svg>  
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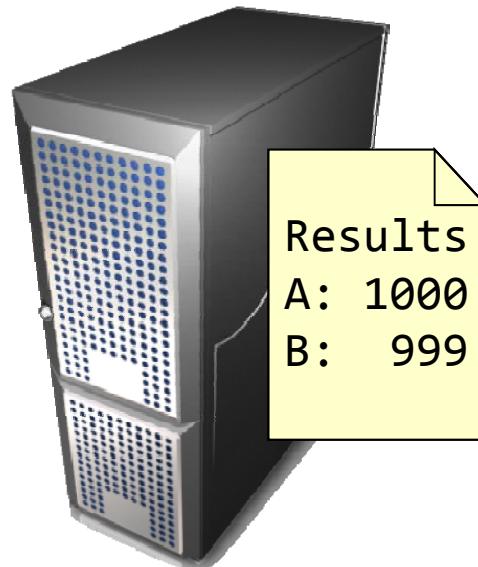
## 8.3 Server-side Threats





**Denial of Service**

**Insider Attacks**

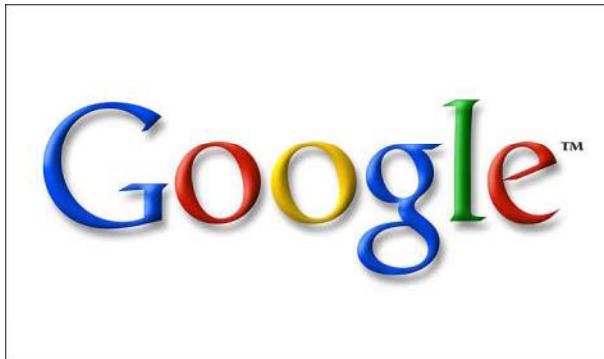


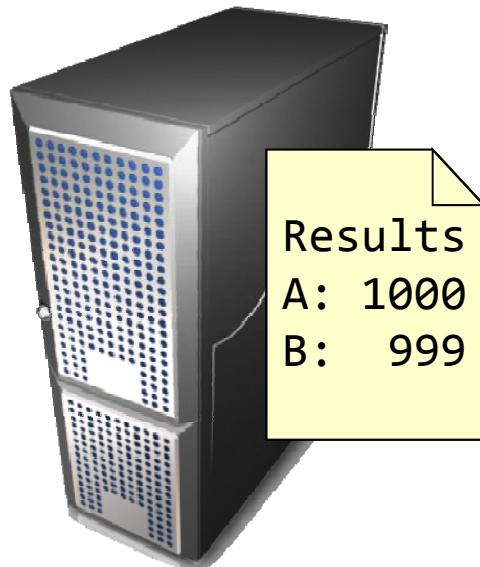
**Denial of Service**

**Insider Attacks**

**Remote Intrusion**

## Advanced Persistent Threats





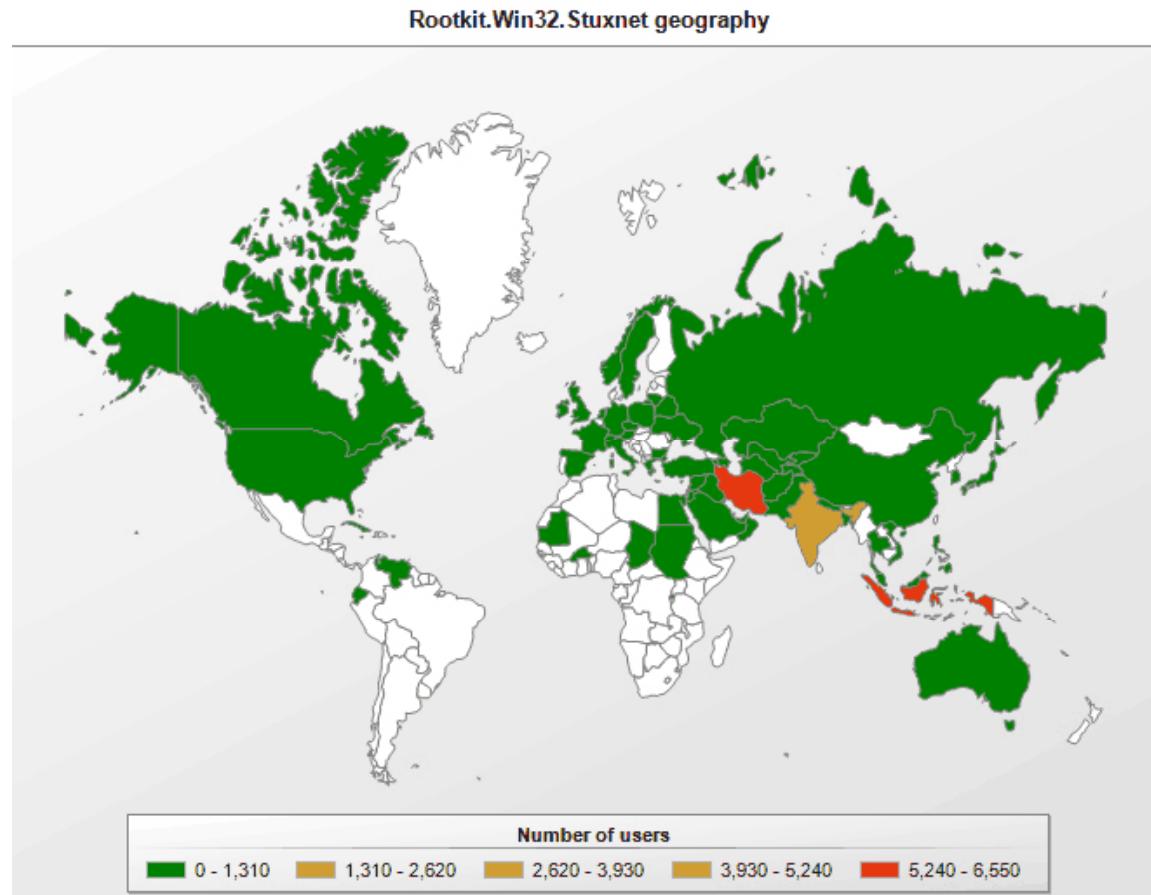
**Denial of Service**

**Insider Attacks**

**Remote Intrusion**

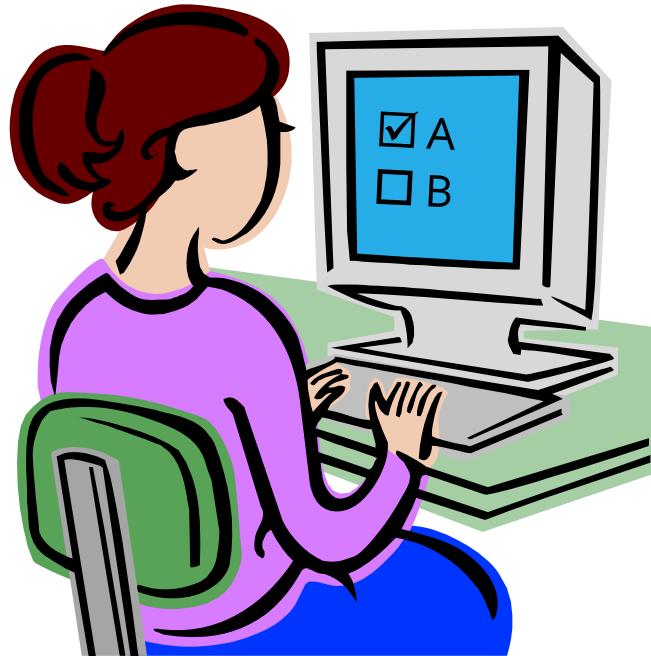
**State-Sponsored Attacks**

## 8.3 Server-side Threats



Source: <http://ebiquity.umbc.edu/blogger/2010/09/23/is-stuxnet-a-cyber-weapon-aimed-at-an-iranian-nuclear-site/>

## 8.3 Server-side Threats



vs.



**Internet Voting**

**Postal Voting**

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Via Wikimedia Commons, [http://en.wikipedia.org/wiki/File:Oregon\\_ballot\\_return\\_box.jpg](http://en.wikipedia.org/wiki/File:Oregon_ballot_return_box.jpg)

### 8.3 Server-side Threats



Internet Voting

vs.



Online Banking

# Washington, D.C.



DISTRICT OF COLUMBIA  
**BOARD OF ELECTIONS AND ETHICS**  
WASHINGTON, D.C. 20001-2745



**MEDIA RELEASE**

D.C. BOARD OF ELECTIONS AND ETHICS  
September 21, 2010

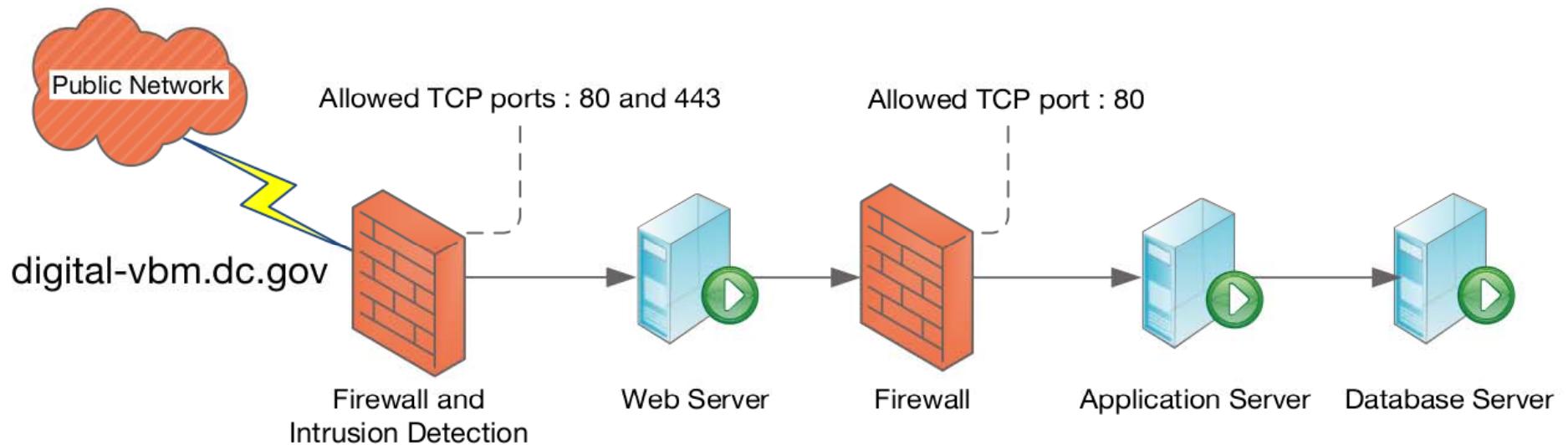
Contact: Alysoun McLaughlin, amclaughlin@dcboee.org  
202-727-2511 (direct)/202-441-1121 (cell)

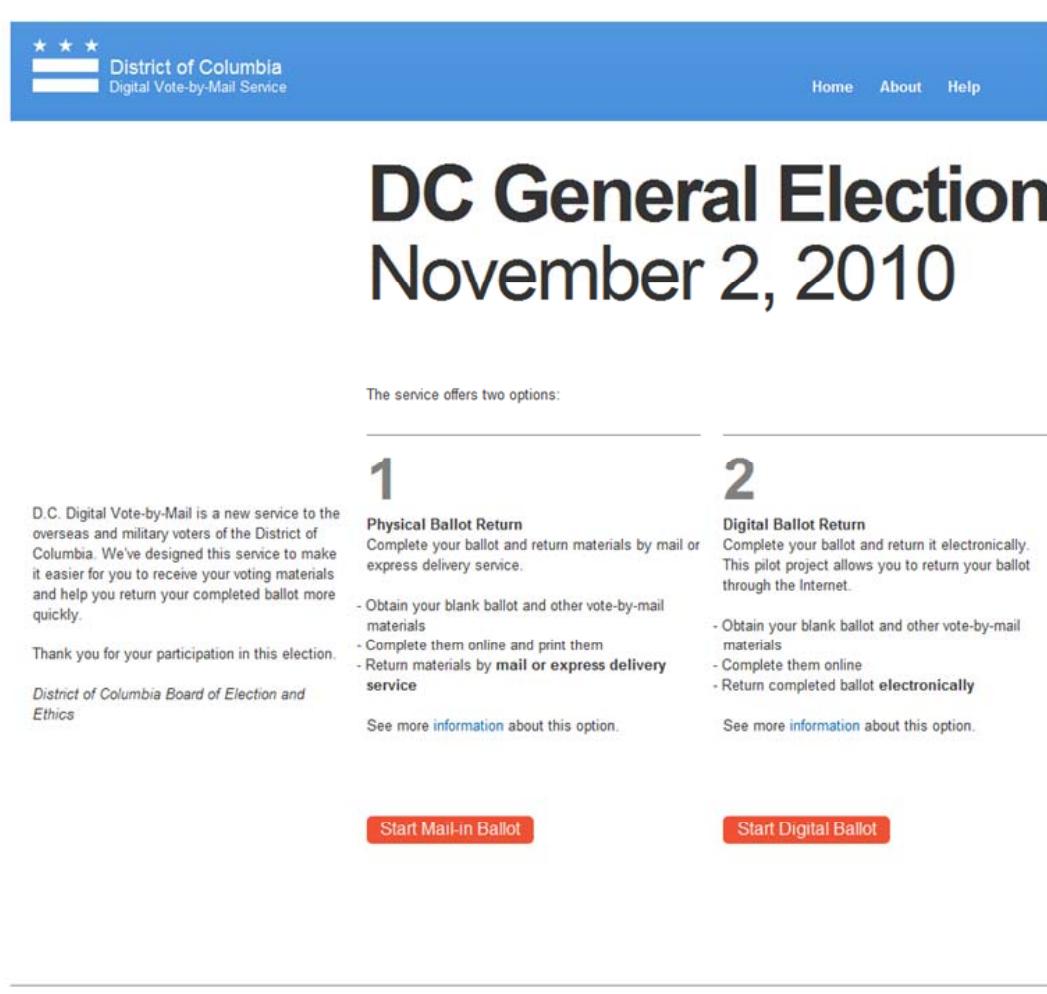
**Board Announces Public Test of  
Digital Vote by Mail Service**

*Open Source Solution Provides Secure Alternative for Overseas Voters  
Who Are Underserved by Traditional Vote by Mail*

WASHINGTON, D.C. —The Board of Elections and Ethics today announced that the public examination phase of the Digital Vote by Mail pilot project for overseas voters will begin on Friday, September 24.

[http://www.dcboee.org/pdf\\_files/nr\\_588.pdf](http://www.dcboee.org/pdf_files/nr_588.pdf)





The screenshot shows the homepage of the District of Columbia Digital Vote-by-Mail Service. At the top, there's a blue header bar with the title "Securing Digital Democracy" and a large yellow "M" logo. Below the header, the DC seal and the text "District of Columbia Digital Vote-by-Mail Service" are visible. A navigation menu with links to "Home", "About", and "Help" is also present. The main content area features a large, bold title "DC General Election November 2, 2010". Below this, a sub-section titled "The service offers two options:" lists two methods for voting:

- 1 Physical Ballot Return**:  
Complete your ballot and return materials by mail or express delivery service.
  - Obtain your blank ballot and other vote-by-mail materials
  - Complete them online and print them
  - Return materials by mail or express delivery serviceSee more [information](#) about this option.
- 2 Digital Ballot Return**:  
Complete your ballot and return it electronically. This pilot project allows you to return your ballot through the Internet.
  - Obtain your blank ballot and other vote-by-mail materials
  - Complete them online
  - Return completed ballot **electronically**See more [information](#) about this option.

At the bottom, two red buttons offer direct access: "Start Mail-in Ballot" and "Start Digital Ballot".

 District of Columbia  
Digital Vote-by-Mail Service

Home   About   Help

DC Specific Election  
November 2, 2010      Digital Vote-by-Mail Service  
Here are the steps you will follow to complete your ballot. Once you have reviewed the steps,  
click Continue.

---

1      **Check In**      Enter name, ZIP code, voter ID number, and PIN

---

2      **Confirm Identity**      Confirm your identity  
Affirm voting eligibility  
Review attestation document (optional)

---

3      **Complete Ballot**      Download your ballot  
View your ballot  
Mark your ballot  
Save your ballot (Do NOT rename the file.)

---

4      **Send Ballot**      Locate your ballot on your computer  
Upload your ballot  
Receive notice of ballot receipt

---

**Key Dates**

**October 1**  
Vote-by-Mail service begins

**October 22**  
Last day to apply for a Vote-by-Mail Ballot

Complete [instructions](#) for the Digital Vote-by-Mail Service.      Find out more about D.C. Digital Vote-by-mail, and the digital ballot return pilot project.

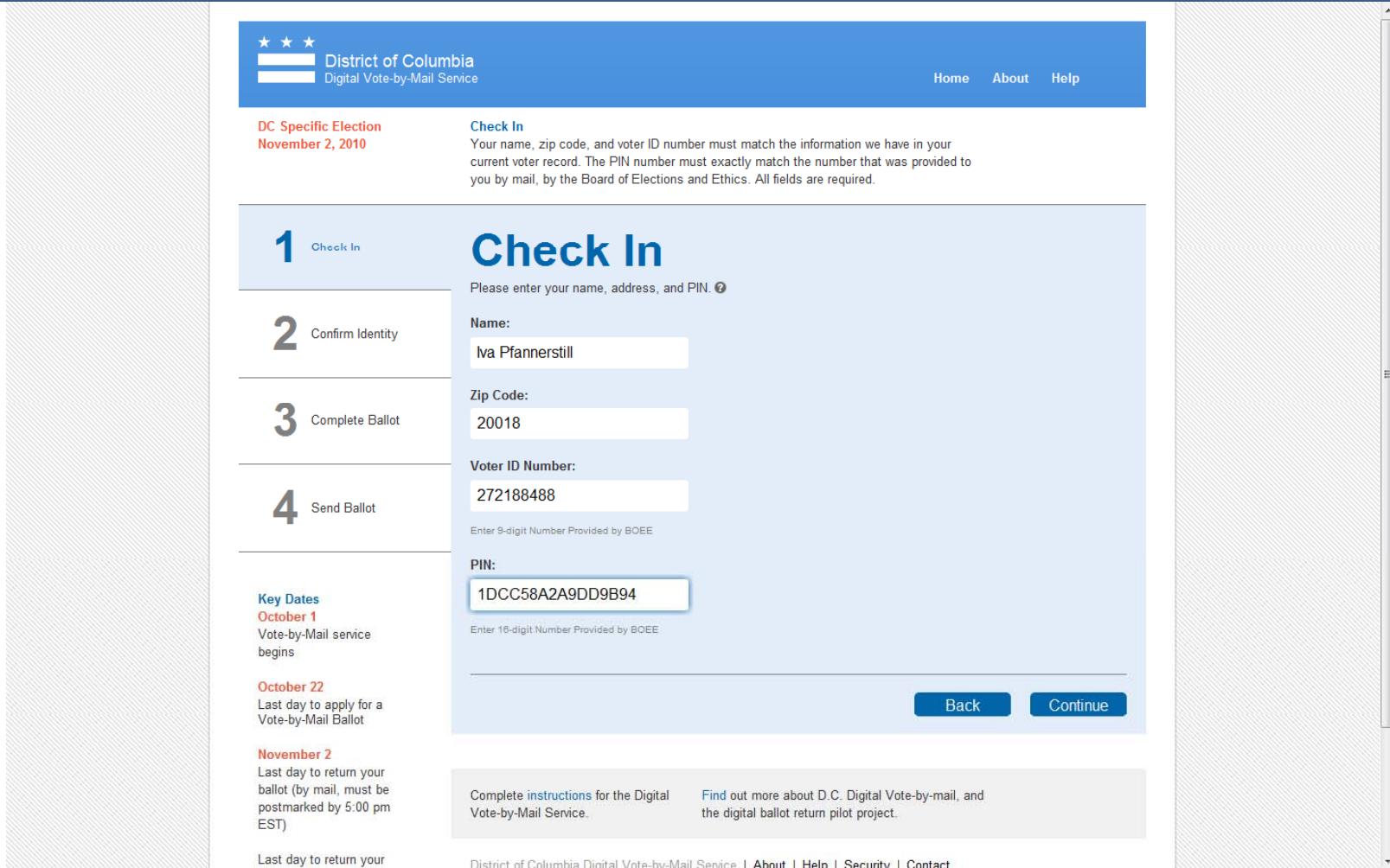
Back      Continue

District of Columbia Digital Vote-by-Mail Service | [About](#) | [Help](#) | [Security](#) | [Contact](#)

[https://testthevote.org/check\\_in](https://testthevote.org/check_in)

## 8.4 Washington, D.C.

## Securing Digital Democracy



The screenshot shows the 'Check In' step of the District of Columbia Digital Vote-by-Mail Service. The page has a blue header with the service's logo and navigation links for Home, About, and Help. On the left, a vertical sidebar lists four steps: 1. Check In (current), 2. Confirm Identity, 3. Complete Ballot, and 4. Send Ballot. Below these are key dates: October 1 (service begins), October 22 (last day to apply for a ballot), November 2 (last day to return the ballot). The main content area is titled 'Check In' and contains fields for Name (Iva Pfannerstill), Zip Code (20018), Voter ID Number (272188488), and PIN (1DCC58A2A9DD9B94). Buttons for 'Back' and 'Continue' are at the bottom. A note at the bottom right encourages users to complete instructions for the service and learn about the digital ballot return pilot project.

DC Specific Election  
November 2, 2010

Check In  
Your name, zip code, and voter ID number must match the information we have in your current voter record. The PIN number must exactly match the number that was provided to you by mail, by the Board of Elections and Ethics. All fields are required.

1 Check In

2 Confirm Identity

3 Complete Ballot

4 Send Ballot

**Key Dates**

**October 1**  
Vote-by-Mail service begins

**October 22**  
Last day to apply for a Vote-by-Mail Ballot

**November 2**  
Last day to return your ballot (by mail, must be postmarked by 5:00 pm EST)

Last day to return your

**Check In**

Please enter your name, address, and PIN. ?

Name: Iva Pfannerstill

Zip Code: 20018

Voter ID Number: 272188488

Enter 9-digit Number Provided by BOEE

PIN: 1DCC58A2A9DD9B94

Enter 16-digit Number Provided by BOEE

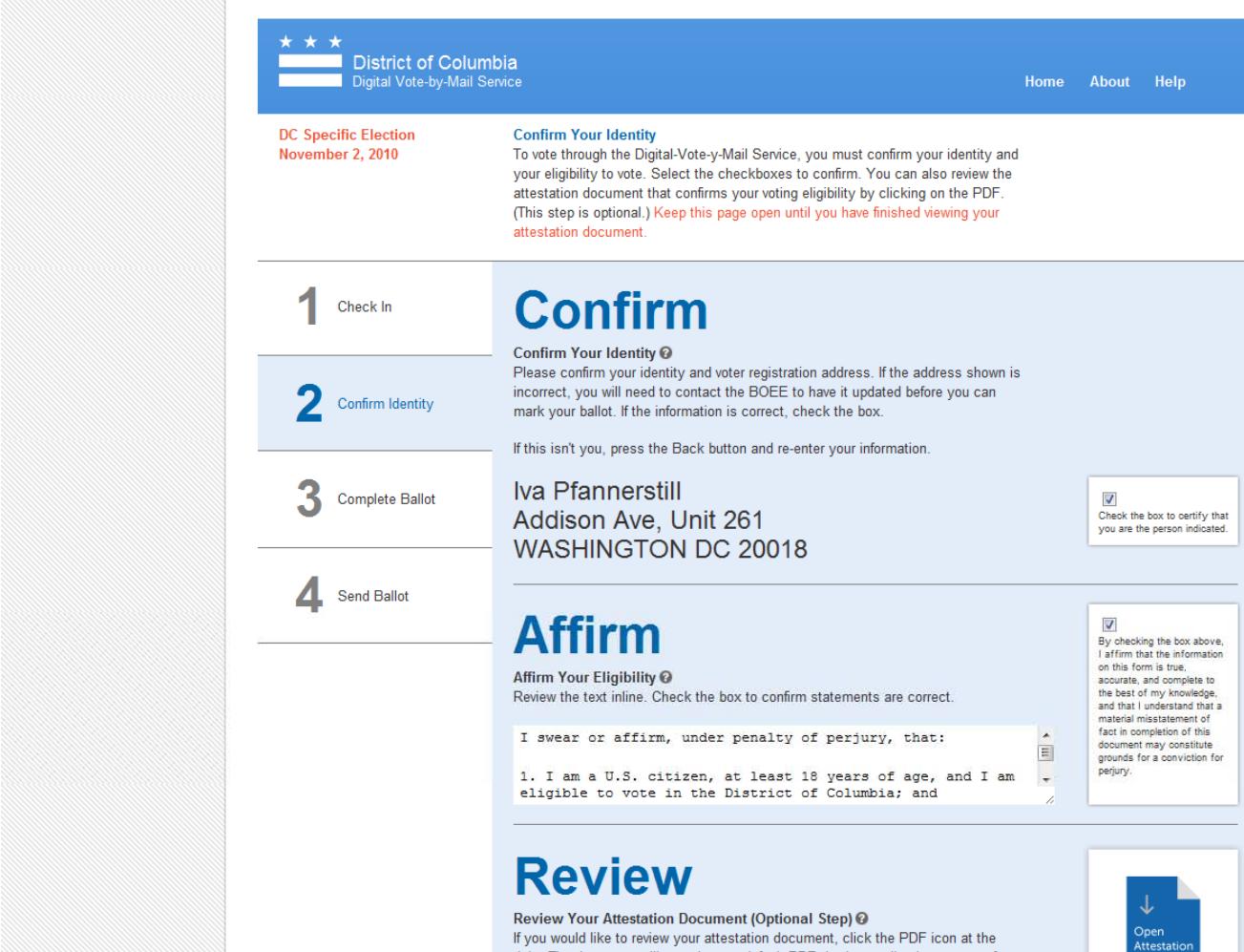
**Back** **Continue**

Complete [instructions](#) for the Digital Vote-by-Mail Service. Find out more about D.C. Digital Vote-by-mail, and the digital ballot return pilot project.

District of Columbia Digital Vote-by-Mail Service | [About](#) | [Help](#) | [Security](#) | [Contact](#)

## 8.4 Washington, D.C.

## Securing Digital Democracy



The screenshot shows a digital voting interface for the District of Columbia. At the top, there's a blue header bar with the text "District of Columbia Digital Vote-by-Mail Service". Below the header, a sidebar on the left lists four steps: "1 Check In", "2 Confirm Identity", "3 Complete Ballot", and "4 Send Ballot". The main content area is titled "Confirm Your Identity". It contains instructions for confirming identity and voter registration address, followed by a section for entering personal information (name and address) and a checkbox to certify the information. Below this is the "Affirm" section, which includes a statement of affirmation under penalty of perjury and a checkbox for that statement. At the bottom, there's a "Review" section with a link to an optional attestation document.

DC Specific Election  
November 2, 2010

Home   About   Help

1 Check In

2 Confirm Identity

3 Complete Ballot

4 Send Ballot

Confirm Your Identity

To vote through the Digital-Vote-by-Mail Service, you must confirm your identity and your eligibility to vote. Select the checkboxes to confirm. You can also review the attestation document that confirms your voting eligibility by clicking on the PDF. (This step is optional.) [Keep this page open until you have finished viewing your attestation document.](#)

**Confirm**

Confirm Your Identity ?

Please confirm your identity and voter registration address. If the address shown is incorrect, you will need to contact the BOEE to have it updated before you can mark your ballot. If the information is correct, check the box.

If this isn't you, press the Back button and re-enter your information.

Iva Pfannerstill  
Addison Ave, Unit 261  
WASHINGTON DC 20018

Check the box to certify that you are the person indicated.

**Affirm**

Affirm Your Eligibility ?

Review the text inline. Check the box to confirm statements are correct.

I swear or affirm, under penalty of perjury, that:

1. I am a U.S. citizen, at least 18 years of age, and I am eligible to vote in the District of Columbia; and

By checking the box above, I affirm that the information on this form is true, accurate, and complete to the best of my knowledge, and that I understand that a material misstatement of fact in completion of this document may constitute grounds for a conviction for perjury.

**Review**

Review Your Attestation Document (Optional Step) ?

If you would like to review your attestation document, click the PDF icon at the bottom of this page.

 Open Attestation

## 8.4 Washington, D.C.

## Securing Digital Democracy

 District of Columbia  
Digital Vote-by-Mail Service

Home   About   Help

**DC Specific Election**  
**November 2, 2010**

**Complete Ballot**  
Digital ballot return lets you return your ballot electronically. You will need to save your marked ballot, locate it on your computer, and upload it to the BOEE. [Keep this page open until you have saved your completed ballot.](#)

**1 Check In**

**2 Confirm Identity**

**3 Complete Ballot**

**4 Send Ballot**

**Key Dates**  
**October 1**  
Vote-by-Mail service begins

**October 22**  
Last day to apply for a Vote-by-Mail Ballot

**November 2**  
Last day to return your ballot (by mail, must be postmarked by 5:00 pm)

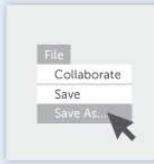
**Download**  
**Download and View Your Ballot**  
Click the PDF icon at the right to download your ballot. The ballot PDF will open in your default PDF viewing application, on top of your web browser.



**Mark**  
**Mark Your Ballot**  
To complete the ballot online, click on the circles next to your candidates to select them. You can also type in candidates where indicated.



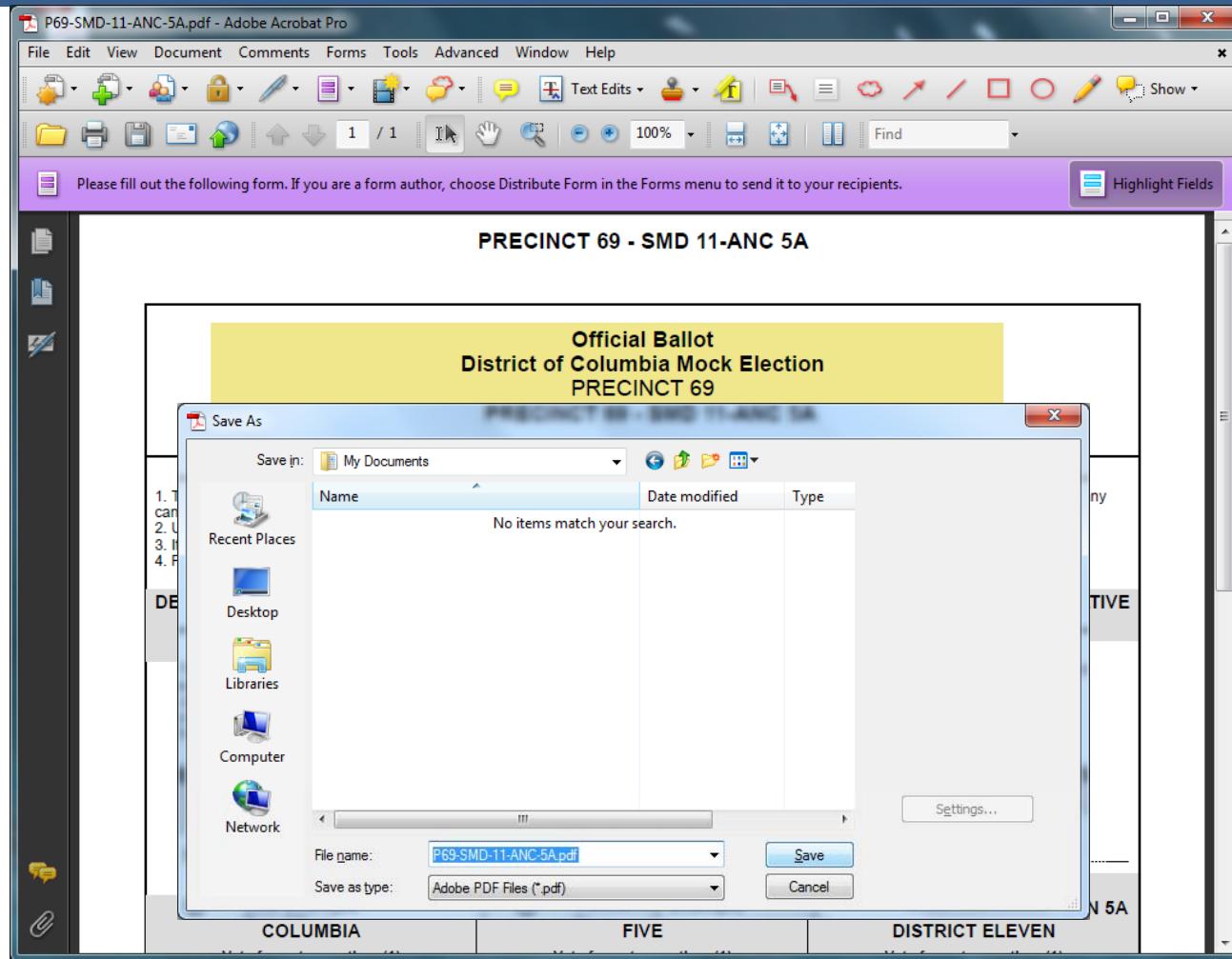
**Save**  
**Save Your Ballot**   
You must save your ballot when you have marked it. Save the PDF on your computer by selecting File/Save As in your default PDF viewing application. Save the ballot to a place where you can easily find it again (for example, your desktop). Do NOT rename the ballot.



Back   Continue

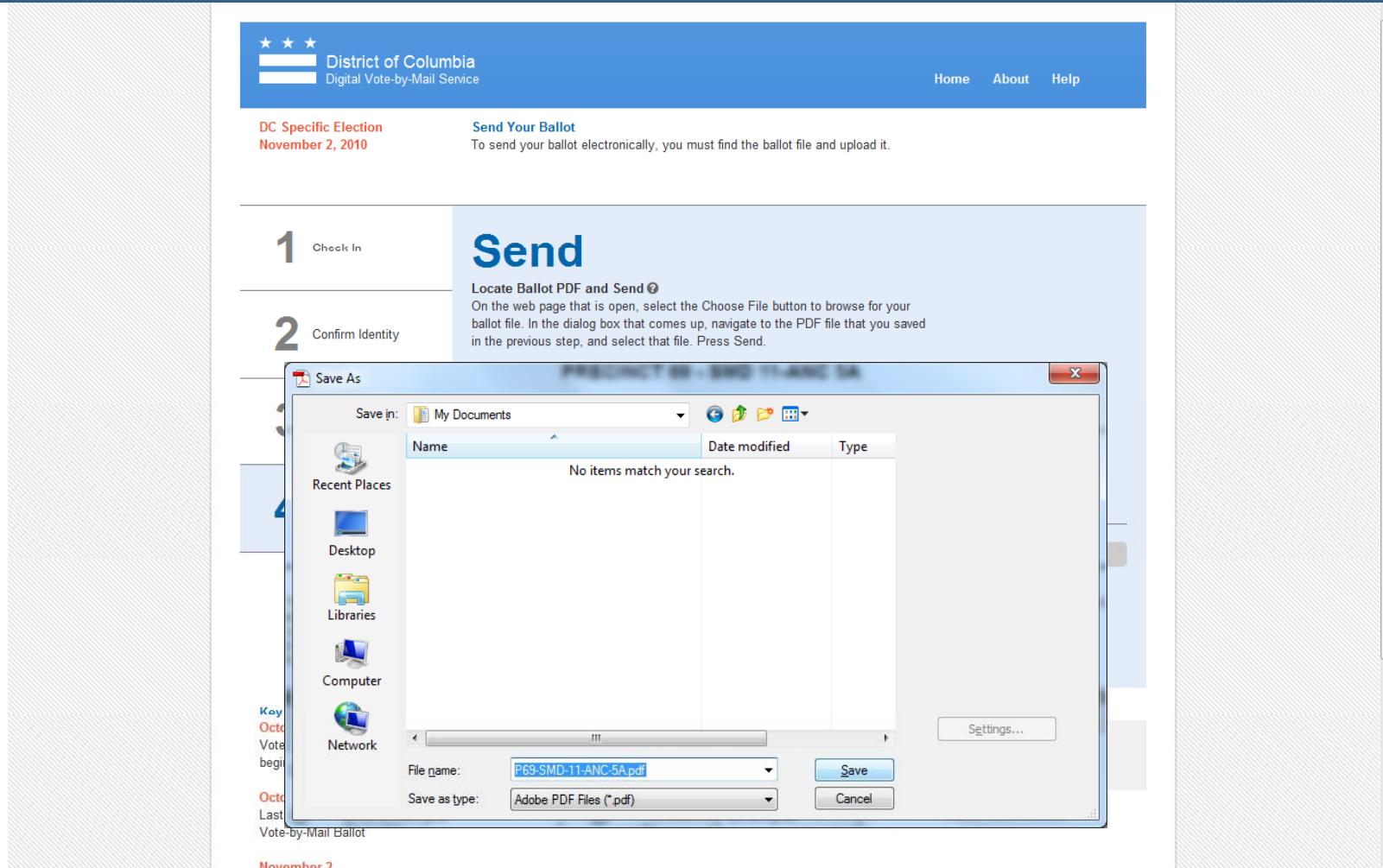
[https://testthevote.org/assets/ballot\\_styles/P69-SMD-11-ANC-5A.pdf?1285465645](https://testthevote.org/assets/ballot_styles/P69-SMD-11-ANC-5A.pdf?1285465645)

## 8.4 Washington, D.C.



## 8.4 Washington, D.C.

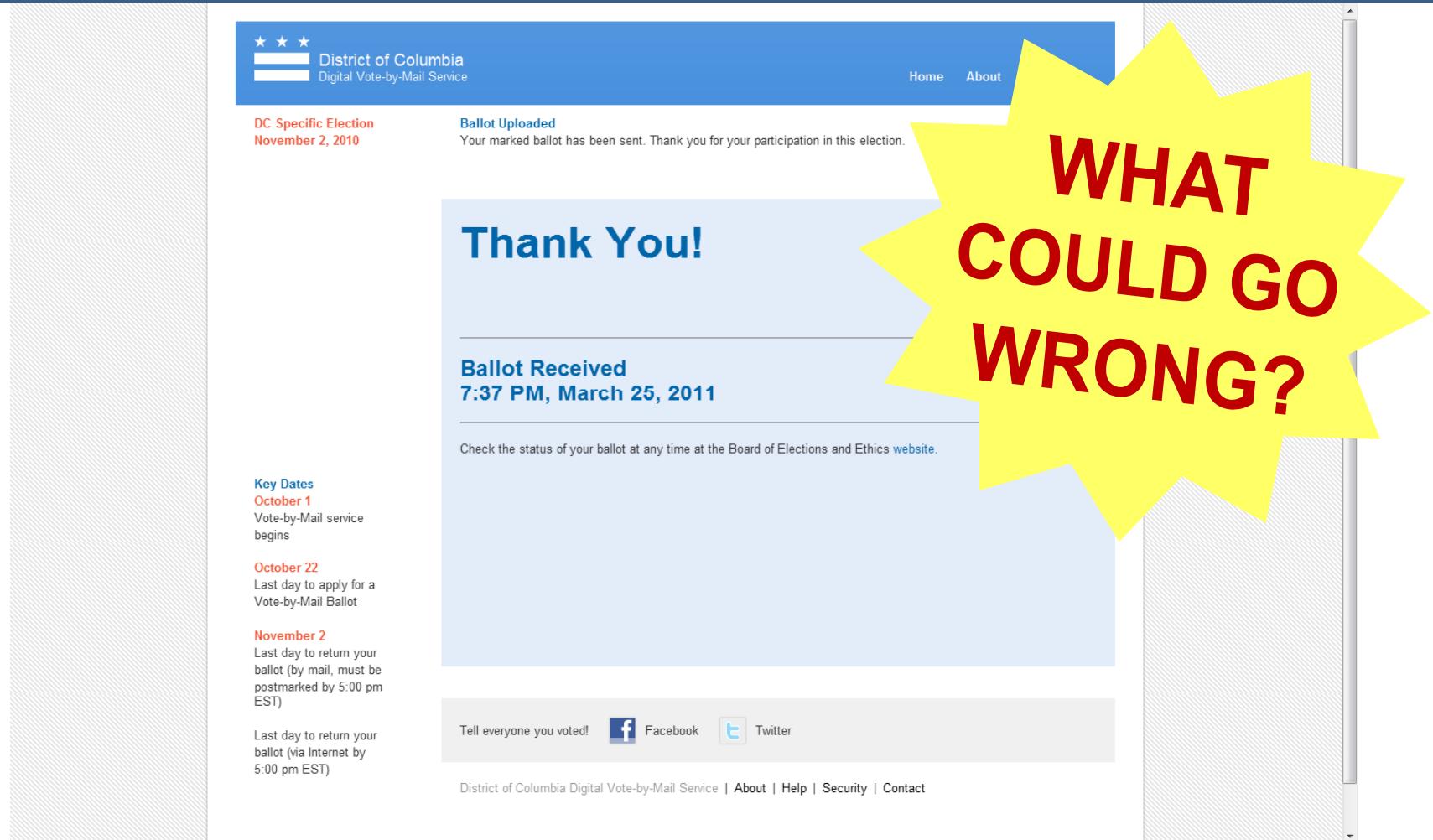
## Securing Digital Democracy



The screenshot shows the District of Columbia Digital Vote-by-Mail Service website. At the top, there is a navigation bar with links for Home, About, and Help. Below the navigation bar, a section for the "DC Specific Election November 2, 2010" is displayed, with a link to "Send Your Ballot". A large "Send" button is prominently featured. To the left of the main content area, there is a vertical sidebar with numbered steps: 1. Check In, 2. Confirm Identity, 3. [partially visible], 4. [partially visible]. Step 2 is currently active. Below the sidebar, there is some descriptive text about locating the ballot PDF and sending it. A "Save As" dialog box is overlaid on the page, centered over the "Send" button. The dialog box shows the file path "My Documents" and the file name "P69-SMD-11-ANC-5A.pdf". The "Save" button is highlighted. The dialog also includes options for "Save as type: Adobe PDF Files (\*.pdf)" and "Cancel".

## 8.4 Washington, D.C.

## Securing Digital Democracy



**DC Specific Election**  
November 2, 2010

**Ballot Uploaded**  
Your marked ballot has been sent. Thank you for your participation in this election.

**Thank You!**

**Ballot Received**  
7:37 PM, March 25, 2011

Check the status of your ballot at any time at the Board of Elections and Ethics [website](#).

**Key Dates**

**October 1**  
Vote-by-Mail service begins

**October 22**  
Last day to apply for a Vote-by-Mail Ballot

**November 2**  
Last day to return your ballot (by mail, must be postmarked by 5:00 pm EST)

Last day to return your ballot (via Internet by 5:00 pm EST)

Tell everyone you voted! [!\[\]\(735ab89543c6171e29ffb46ef228365d\_img.jpg\) Facebook](#) [!\[\]\(9c452b787f285e5f1b2985e32773aa45\_img.jpg\) Twitter](#)

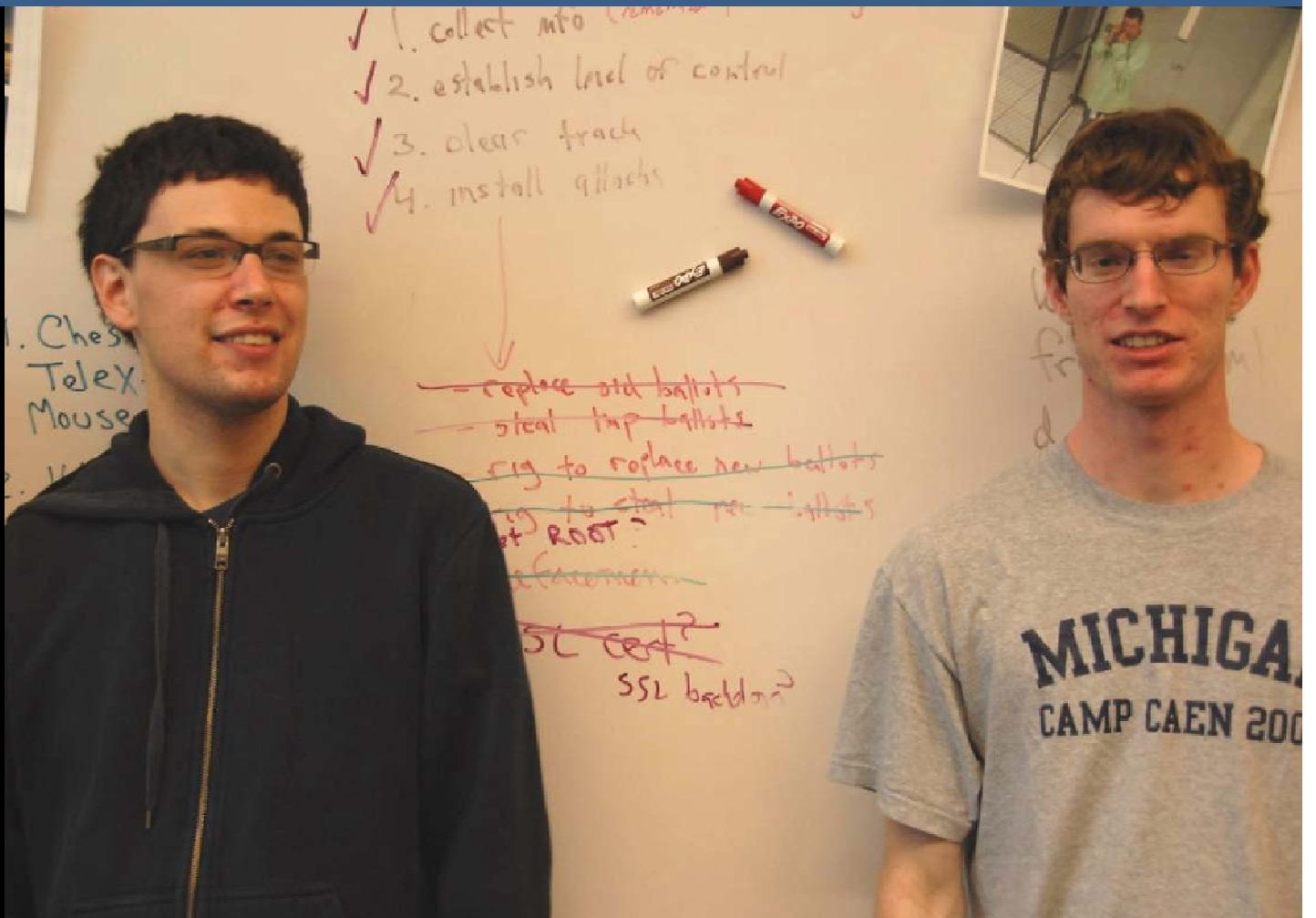
District of Columbia Digital Vote-by-Mail Service | [About](#) | [Help](#) | [Security](#) | [Contact](#)

**WHAT  
COULD GO  
WRONG?**

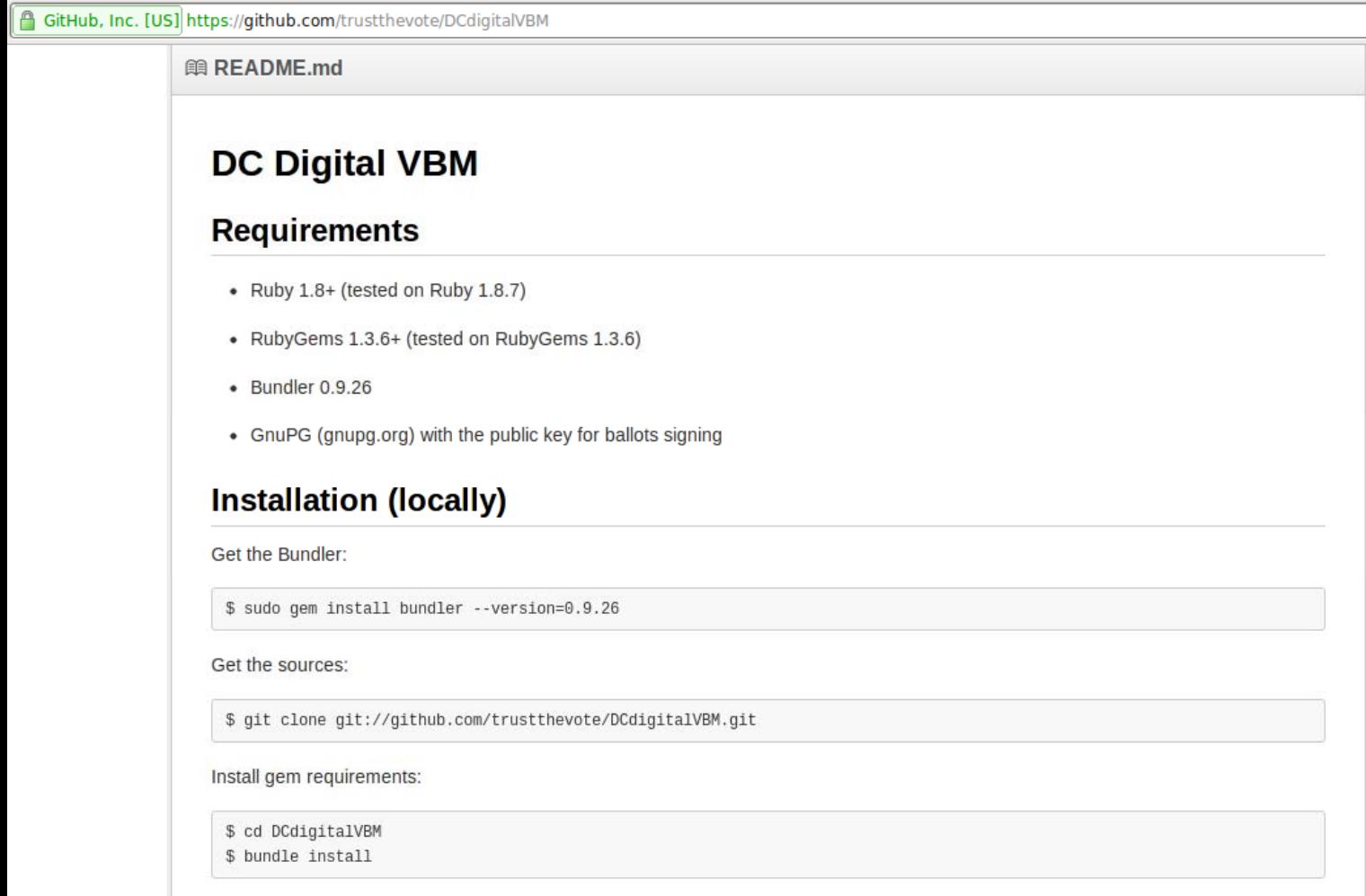
## 8.4 Washington, D.C.

## Securing Digital Democracy

# Recruit



## 8.4 Washington, D.C.



The screenshot shows a GitHub page for the 'DCdigitalVBM' repository. The URL is <https://github.com/trustthevote/DCdigitalVBM>. The page title is 'README.md'. The content includes a section titled 'DC Digital VBM' and 'Requirements' with a bulleted list of dependencies. Below that is a section titled 'Installation (locally)' with instructions for getting the Bundler, sources, and gem requirements.

**DC Digital VBM**

**Requirements**

- Ruby 1.8+ (tested on Ruby 1.8.7)
- RubyGems 1.3.6+ (tested on RubyGems 1.3.6)
- Bundler 0.9.26
- GnuPG (gnupg.org) with the public key for ballots signing

**Installation (locally)**

Get the Bundler:

```
$ sudo gem install bundler --version=0.9.26
```

Get the sources:

```
$ git clone git://github.com/trustthevote/DCdigitalVBM.git
```

Install gem requirements:

```
$ cd DCdigitalVBM  
$ bundle install
```

## 8.4 Washington, D.C.

```
module Paperclip
  class Encrypt < Processor
    def initialize(file, options = {}, attachment = nil)
      super

      @file          = file
      @recipient     = options[:geometry]
      @attachment    = attachment
      @current_format = File.extname(@file.path)
      @basename      = File.basename(@file.path, @current_format)
    end

    def make
      src = @file
      dst = Tempfile.new([\@basename, 'gpg'].compact.join('.'))
      dst.binmode

      raise PaperclipError, "GPG recipient wasn't set" if @recipient.blank?

      begin
        run("rm", "-f \#{File.expand_path(dst.path)}")
        run("gpg", "--trust-model always -o \#{File.expand_path(dst.path)}\\" -e -r \#{@recipient}\\" \#")
      rescue PaperclipCommandLineError
        raise PaperclipError, "couldn't be encrypted. Please try again later."
      end
    end
  end
end
```

ballot.pdf → /tmp/49d5.pdf

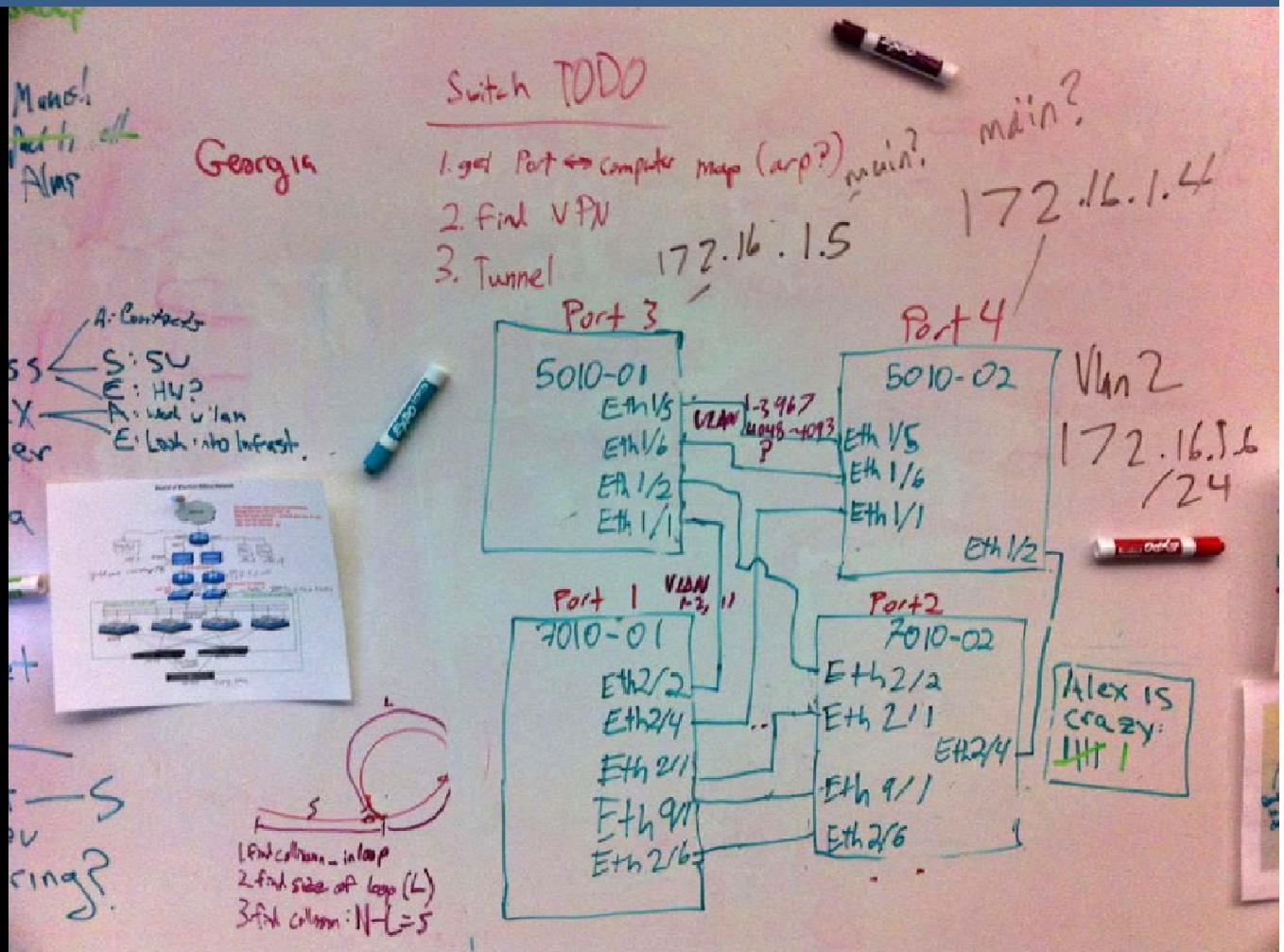
ballot.xyz → /tmp/49d5.xyz

ballot.\$(sleep 5) → "/tmp/49d5.\$(sleep 5)"

## 8.4 Washington, D.C.

## Securing Digital Democracy M

# Surveil



## 8.4 Washington, D.C.

## Securing Digital Democracy M

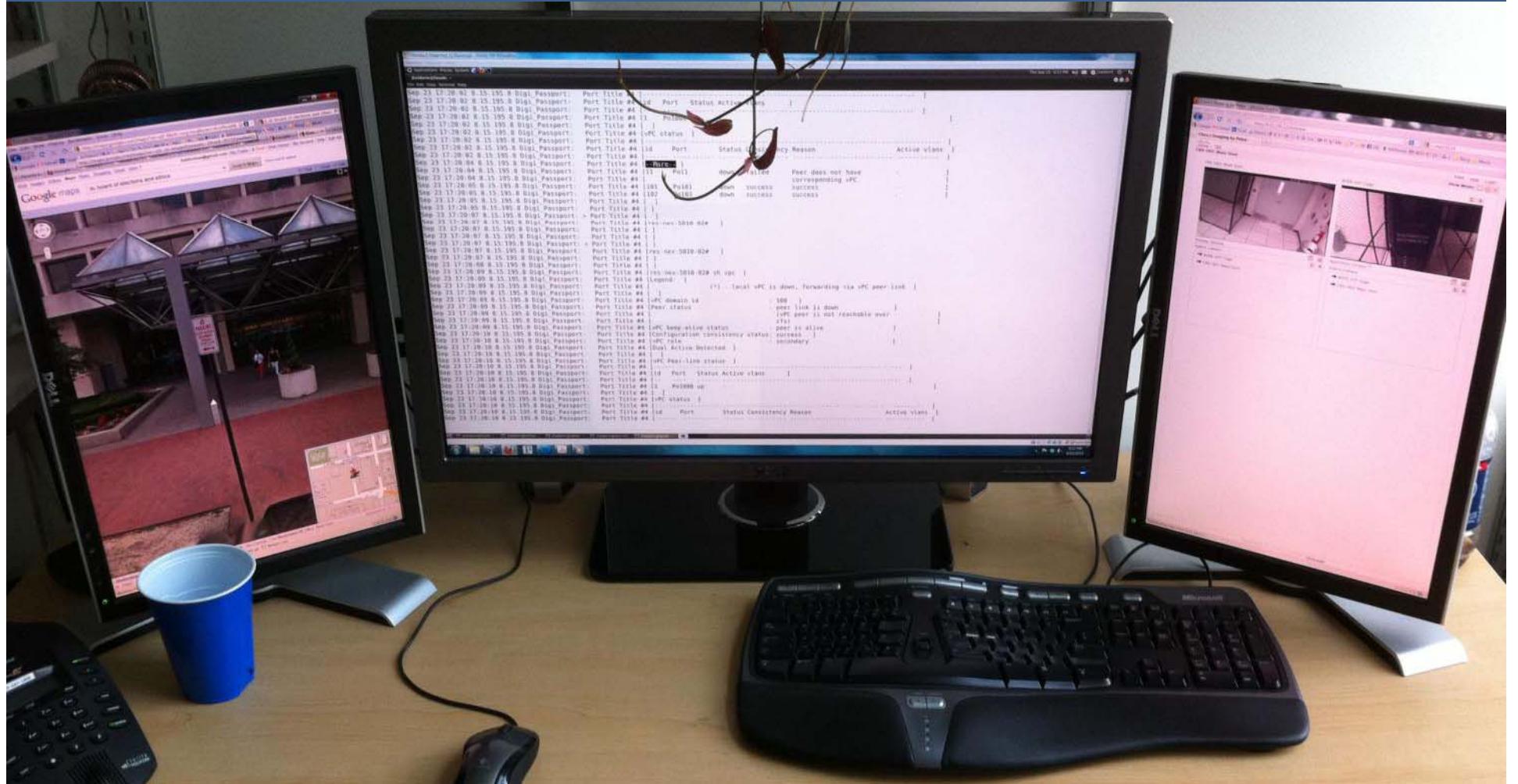
The screenshot shows a Mozilla Firefox browser window displaying the Digi Configuration and Management interface at [https://8.15.195.8/useradmin.asp?CURRENT\\_PATH=/admin/user\\_admin&conf\\_root](https://8.15.195.8/useradmin.asp?CURRENT_PATH=/admin/user_admin&conf_root). The title bar of the browser reads "Digi Configuration and Management - Mozilla Firefox". The main content area is titled "Digi Passport™ 8 Configuration and Management". On the left, a sidebar menu is open under "User : root", showing options like Network, Serial port, Clustering, Power controller, Peripherals, Custom menu, System status & log, System administration, and User administration (which is currently selected). The main panel displays "User administration" with a search bar for "User name" and "User group". Below this is a table titled "Current local users" listing five entries:

#	User name	User group	Shell
1	Hoang	System admin	Configuration menu
2	admin	System admin	Configuration menu
3	lle	System admin	Configuration menu
4	oceee	System admin	Configuration menu
5	root	Root	CLI

At the bottom of the main panel are buttons for "Add", "Remove", and "Unlock".

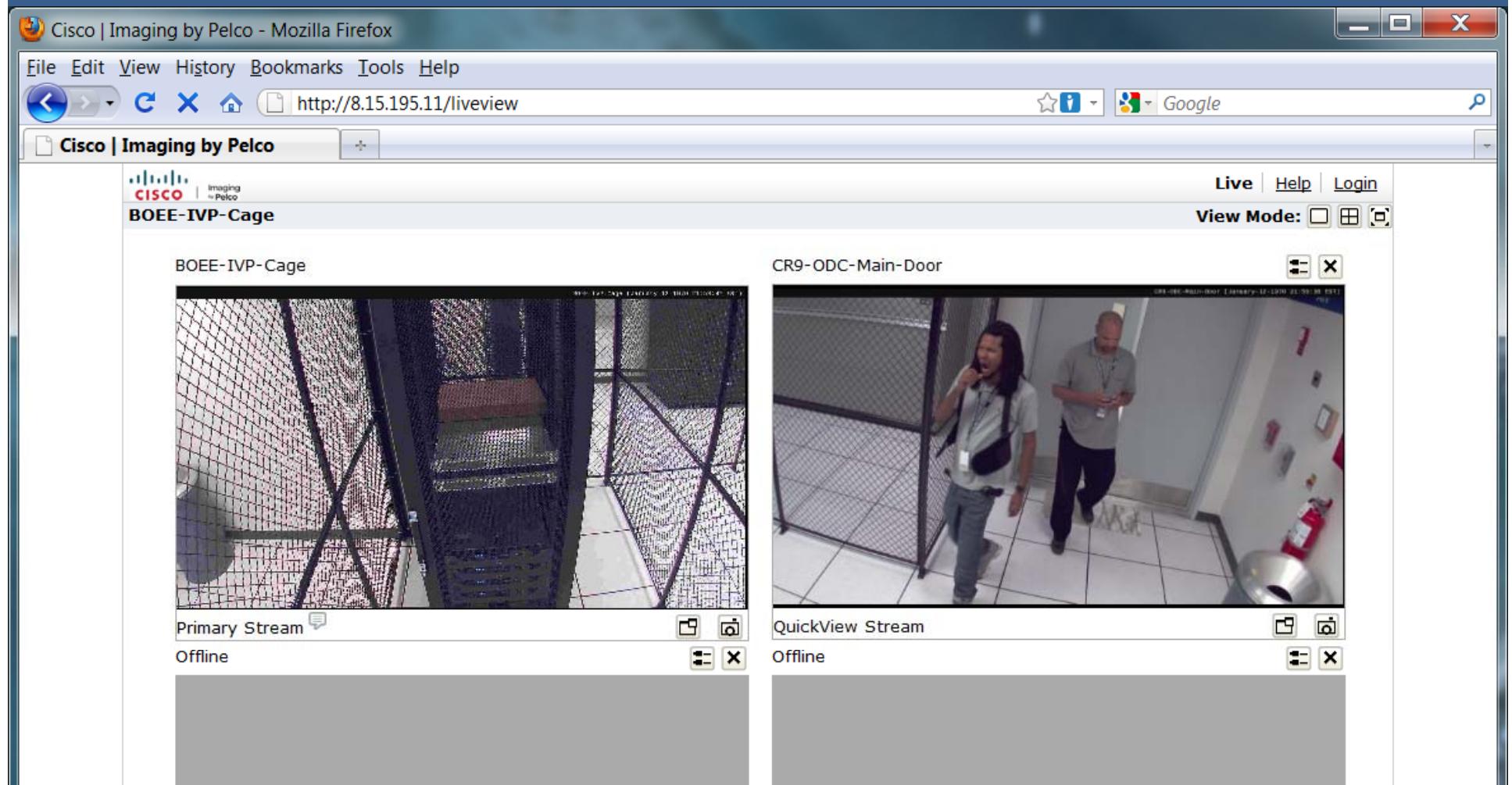
## 8.4 Washington, D.C.

## Securing Digital Democracy

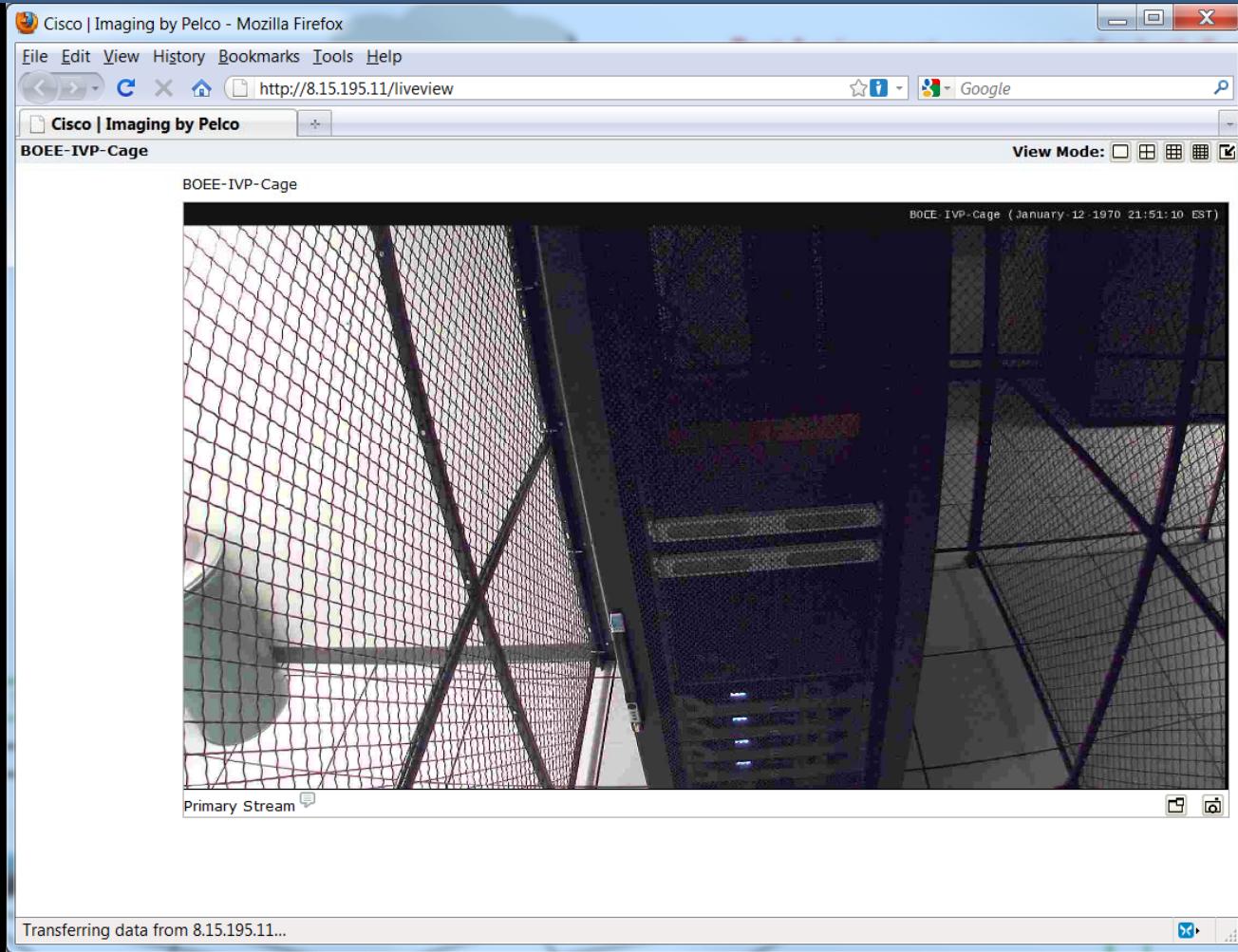


## 8.4 Washington, D.C.

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## 8.4 Washington, D.C.



## 8.4 Washington, D.C.

Securing Digital Democracy 

CR9-ODC-Main-Door (January-14-1970 02:45:12 EST)



## 8.4 Washington, D.C.

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CR9-ODC-Main-Door (January-14-1970 06:14:51 EST)



## 8.4 Washington, D.C.

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CR9-ODC-Main-Door (January-27-1970 22:31:35 EST)



## 8.4 Washington, D.C.

Securing Digital Democracy 

CR9-ODC-Main-Door (January-27-1970 22:31:37 EST)



## 8.4 Washington, D.C.

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CR9-ODC-Main-Door (January-27-1970 22:31:38 EST)



## 8.4 Washington, D.C.

Securing Digital Democracy 

CR9-ODC-Main-Door (January-27-1970 22:31:41 EST)



Steal database passwords vs. etc.

Replace all existing vs.

**WHAT  
COULD GO  
WRONG?**

**Attack!**

## 8.4 Washington, D.C.

## Securing Digital Democracy

Official Ballot District of Columbia Mock Election PRECINCT 22 September 17, 2010			
<b>INSTRUCTIONS TO VOTER</b>			
<p>1. TO VOTE YOU MUST DARKEN THE OVAL TO THE LEFT OF YOUR CHOICE COMPLETELY. An oval darkened to the left of the name of any candidate indicates a vote for that candidate.</p> <p>2. Use only a pencil or black or black medium ball point pen.</p> <p>3. If you make a mistake DO NOT ERASE. Ask for a new ballot.</p> <p>4. For a Write-in candidate, write the name of the person on the line and darken the oval.</p>			
<b>DELEGATE TO THE U.S. HOUSE OF REPRESENTATIVES</b> <small>Vote for not more than (1)</small>	<b>AT-LARGE MEMBER OF THE COUNCIL</b> <small>Vote for not more than (1)</small>	<b>UNITED STATES REPRESENTATIVE</b> <small>Vote for not more than (1)</small>	
<input type="checkbox"/> Alice Example Democratic <input type="checkbox"/> Bob Example Republican <input type="checkbox"/> Carol Example Statehood Green <input checked="" type="checkbox"/> or write-in <u>Skynet</u>	<input type="checkbox"/> Joan Example Statehood Green <input type="checkbox"/> Kimberley Example Democratic <input type="checkbox"/> Liam Example Republican <input checked="" type="checkbox"/> or write-in <u>Johnny 5</u>	<input type="checkbox"/> Latoya Example Republican <input type="checkbox"/> Marcus Example Statehood Green <input type="checkbox"/> Newton Example Democratic <input checked="" type="checkbox"/> or write-in <u>Colossus</u>	
<b>MAYOR OF THE DISTRICT OF COLUMBIA</b> <small>Vote for not more than (1)</small>	<b>MEMBER OF THE COUNCIL WARD ONE</b> <small>Vote for not more than (1)</small>	<b>MEMBER OF ADVISORY NEIGHBORHOOD COMMISSION 1B DISTRICT FOUR</b> <small>Vote for not more than (1)</small>	
<input type="checkbox"/> Duane Example Republican <input type="checkbox"/> Edward Example Democratic <input type="checkbox"/> Frances Example Statehood Green <input checked="" type="checkbox"/> or write-in <u>Master Control Program</u>	<input type="checkbox"/> Mary Example Republican <input type="checkbox"/> Nitan Example Democratic <input type="checkbox"/> Odell Example Statehood Green <input checked="" type="checkbox"/> or write-in <u>GLaDOS</u>	<input type="checkbox"/> Orlando Example Democratic <input type="checkbox"/> Phyllis Example Statehood Green <input type="checkbox"/> Quincy Example Republican <input checked="" type="checkbox"/> or write-in <u>Deep Thought</u>	
<b>CHAIRMAN OF THE COUNCIL</b> <small>Vote for not more than (1)</small>	<b>MEMBER OF STATE BOARD OF EDUCATION WARD ONE</b> <small>Vote for not more than (1)</small>	<b>Thank you for voting. Please turn in your ballot</b>	
<input type="checkbox"/> Gregory Example Statehood Green <input type="checkbox"/> Helen Example Republican <input type="checkbox"/> Inez Example Democratic <input checked="" type="checkbox"/> or write-in <u>HAL 9000</u>	<input type="checkbox"/> Abigail Example Republican <input type="checkbox"/> Yvonne Example Democratic <input type="checkbox"/> Zachary Example Statehood Green <input checked="" type="checkbox"/> or write-in <u>Bender</u>		

Steal database passwords, keys, etc.

Replace all existing votes with ours

Replace any new votes

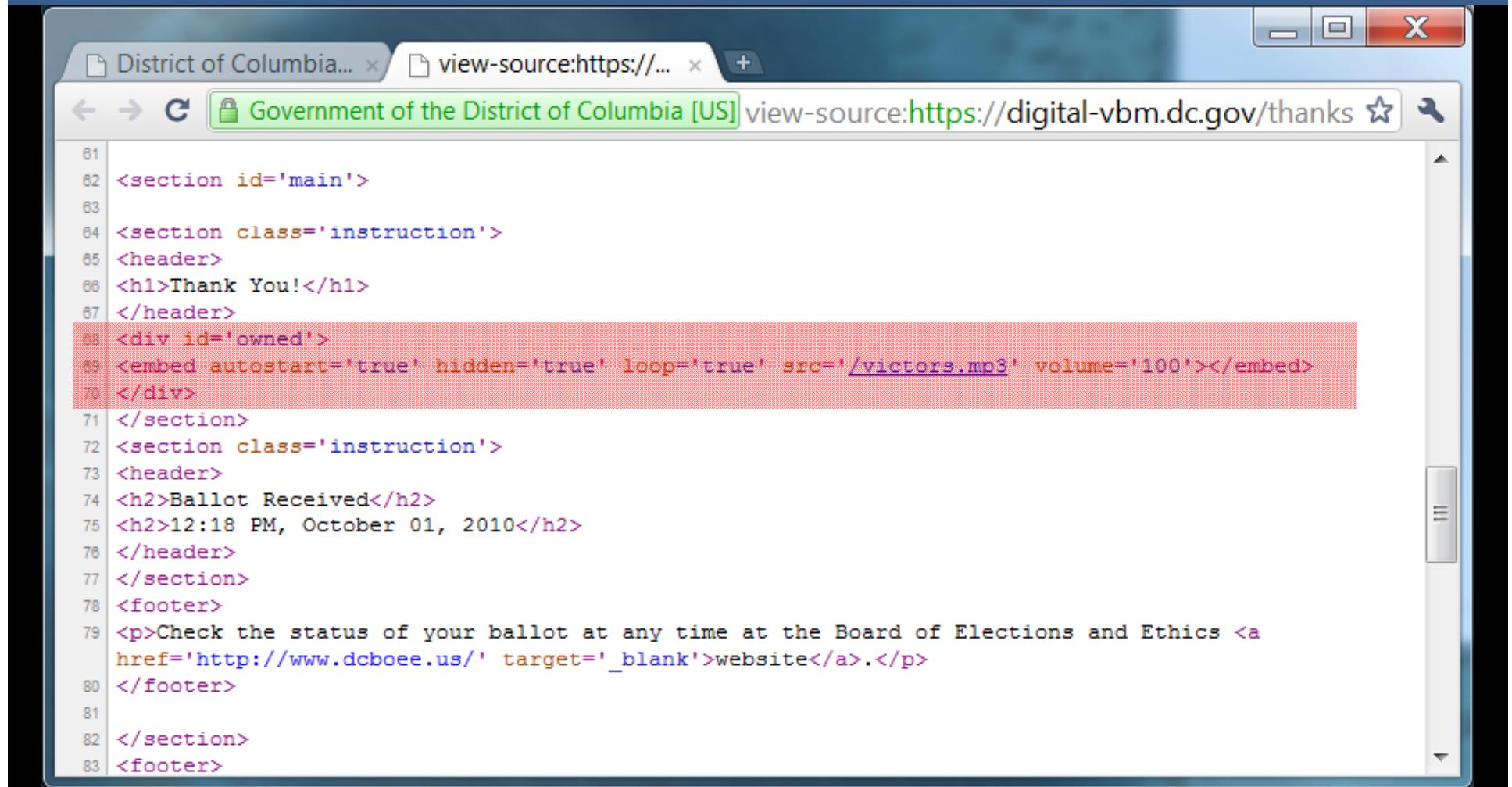
Back door to reveal new votes

## Attack!

Clear logs

“Calling card”

## 8.4 Washington, D.C.



The screenshot shows a web browser window displaying the source code of a webpage. The title bar indicates the page is from the "Government of the District of Columbia [US]" and the URL is "view-source:https://digital-vbm.dc.gov/thanks". The source code itself is as follows:

```
61 <section id='main'>
62   <section class='instruction'>
63     <header>
64       <h1>Thank You!</h1>
65     </header>
66     <div id='owned'>
67       <embed autostart='true' hidden='true' loop='true' src='/victors.mp3' volume='100'></embed>
68     </div>
69   </section>
70   <section class='instruction'>
71     <header>
72       <h2>Ballot Received</h2>
73       <h2>12:18 PM, October 01, 2010</h2>
74     </header>
75   </section>
76   <footer>
77     <p>Check the status of your ballot at any time at the Board of Elections and Ethics <a href='http://www.d cboee.us/' target='_blank'>website</a>.</p>
78   </footer>
79   </section>
80   <footer>
81     </div>
82   </footer>
83 </div>
```

One more thing...

## 8.4 Washington, D.C.

## Securing Digital Democracy



DISTRICT OF COLUMBIA  
**BOARD OF ELECTIONS AND ETHICS**  
441 4<sup>TH</sup> STREET NW, SUITE 250  
WASHINGTON, D.C. 20001-2745

### D.C. Overseas Digital Vote by Mail Service

Dear HARRIET DANIEL:

You have been selected to participate in the Digital Vote by Mail initiative. As part of its implementation of the MOVE Act, the District of Columbia Board of Elections and Ethics (BOEE) will offer overseas voters an option to receive and, optionally, send their absentee ballots digitally. While you may choose to return your absentee ballot by mail or fax, the BOEE's Digital Vote by Mail process provides you a rapid return option that will maintain ballot secrecy and integrity.

#### The Way it Works

Approved overseas and military voters with internet access, such as you, may log on to our special digital delivery website. In your internet browser type in: <http://www.d cboee.us/dvm> in the address field. You will then be prompted to provide your name, address and personal identification number. For security purposes, please enter the information EXACTLY as listed below.

Voter ID Number:

[REDACTED]

Your name as listed with BOEE:

**HARRIET SANDRA DANIEL**

Residence Zip Code:

**20007**

Personal Identification Number:

**BD15B35F1E3C4186**

If your information needs to be updated, please contact our office separately by calling (202) 727-2525 or by visiting our website <http://www.d cboee.org>. DO NOT enter updated information in the Digital Vote by Mail website.

Web applications tend to be *brittle*  
(Small mistakes can have huge consequences)

Standard software practices inadequate

Officials not equipped to detect/response

Deep security challenges left to solve

**Lessons** Decades, *if ever*,  
before we can vote online securely.

# Securing Digital Democracy

## Lecture 8 | *Internet Voting?*



J. Alex Halderman  
University of Michigan