Mobile Application Security

Promises and Pitfalls in the New Computing Model

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Partner
Agenda

- Mobile Computing Today
- Security Challenges
- Supporting Security
- Mobile Web Security
- Actions
Mobile Computing Today

Trends
Attack Surfaces
Mobile Phone Sales Per Year

Data from Tomi Ahonen Almanac 2009
Major Smartphone Platforms

- Symbian
- Windows Mobile
- iPhone
- RIM (Blackberry)
- Android
- Palm Pre?
Trend Catalysts

- Sexier Devices
- Younger Generation
- F500 Acceptance
- Multi-Environment Phones

- Unlimited Data Plans
- Provider App Stores
Security Challenges

Defining Security Challenges
Defining the Customer
What is Security?

- Not the PC or Server Model
  - Single User
  - High-Value Information
  - Low-Value Applications
- Availability and Power
- Local Attacker Resistance
The Airline Pocket

• Physical Security Just Doesn’t Exist
• Phones will Be Lost
• Need Ways of Protecting Data
  • Local encryption
  • Cloud storage
Hardware Limitations

- Limited Bandwidth
- Power
- CPU
- Size

Technology Will Solve These
Screen Size

Safari can't verify the identity of the website “www.bofa.com”.
The certificate for this website is invalid. You might be connecting to a website that is pretending to be “www.bofa.com” which could put your confidential information at risk. Would you like to connect to the website anyway?

Show Certificate  Cancel  Continue

Accept Website Certificate
The certificate for this website is invalid. Touch Accept to connect to this website anyway.

Accept  Cancel
Poor Keyboards

C)sOz*a01pdn
Regulations
User Identification

- Real Time
- Must be Available Immediately
- One Handed Interface
- More Prompts than PC
“Ownership”

- OS Vendor
- Carrier
- User
- Application Developer

All “Own” the Phone and Have Differing Objectives
Distribution Challenges

- Indirect Customer Relationship
- Patching Difficulties
  - Carriers are anti-patch
- Long Update Lag
- Multiple Hardware Platforms
Unsafe Languages

- Windows Mobile (C/C++)
  - .Net Mobile Framework (safe)
  - /GS, SafeCRT

- iPhone (Objective-C)
  - Has C Constructs
  - NX Stack/Heap

- Symbian (Symbian C++)
  - C++ with more Complex Memory Management
Desktop Heritage

[iPhone, Android, BlackBerry, Symbian OS]
Vulnerability Count by Platform

Need to add 46 more
Growing Security Activity

- Targeted by Security Community
- CanSecWest
- Asian & European Research
- Commercial Spy Products
Supporting Security

Security Goals
Shift in Computing Models
Platform Comparison
Security Goals

- Users can Safely Run Applications
- OS Protected from Applications
  - A.K.A. Steal Carrier Revenue
- Per-Application Private Data
- Contain Vulnerabilities
Two Models

Old Way
- Normal
- Privileged

New Way
- App
- App
- App
- App
- App
- App
Old Way

- Windows Mobile
- All or Nothing
- Signatures Defines Permission Level
- No or Limited File Permission Systems
- No “users”
  - Good, because it doesn’t make sense
Pros/Cons

Pros
• Easy to Understand
• Easy to Test

Cons
• No Exploit Containment
• User can’t Make Granular Choices
Windows Mobile

App 1  App 2  App 3  App 4

Kernel

File System
Blackberry

- J2ME Based
  - MIDP 2.0 with modifications
  - Class based security
- No Raw Device Access
- Web Services and Web Based Models
Security Opportunities

- More Granular Permissions
- Sandboxed Applications
- Reduced Attack Surface
- Give Users Control of Data
iPhone

- One Distribution Method
- Strict AppStore Policy
- Non-Technological Policy Enforcement

Application Store is a Security Barrier
Android & Symbian
Benefits

- Extensible to Custom Data Types
- Users Have Control
- Same-Developer Sandbox
  - An Office Suite is Possible
  - Attack Surface Increased
Challenges

This application has access to the following:

⚠️ **Network communication**
full Internet access

⚠️ **Your location**
fine (GPS) location

⚠️ **Development tools**
limit number of running processes, make all background applications close, enable application debugging

⚠️ **System tools**
modify global system settings, set preferred applications, restart other applications, modify global animation speed, prevent phone from sleeping

OK
Android Market

- Self-Signed Certificates
- Community Reputation
- No Unsigned Code Allowed

Application Store is a Minor Security Barrier
Technical Comparison

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<tr>
<th>Feature</th>
<th>Blackberry</th>
<th>WinMo 6.x</th>
<th>iPhone 2.2.1</th>
<th>Android</th>
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Securing the Mobile Web

Mobile Web Browsers
Mobile Portal Mistakes
Choosing Thick or Thin
Mobile Web Browsers

Mobile browsers are pulled in two ways:

- Simple
  - Speed over low-bandwidth
  - Rendering on small screens
  - Better user experience without scrolling
  - BB Browser, Feature Phones,

- Compatible
  - Renders like desktop
  - AJAX support (JS and XHR)
  - Plugins?
  - Mobile Safari, Android, Opera Mini
Mobile Web Browsers

• Simple
  • Pros
    • Less attack surface
    • No JS
  • Cons
    • Proxied TLS, W-TLS
    • Bad Security UX
Mobile Web Browsers

• Compatible
  • Pros
    • More professional security work
    • Real TLS
  • Cons
    • Full browser bugs might port
    • Much more complex
    • Too much WebKit
    • Still bad security UX
Mobile Web Browsers

• Common problem: bad security UX

*iPhish. Yuan Niu, Francis Hsu, and Hao Chen @ UC Davis*
Mobile Portals

• Multiple Internet Presences

• Both are on the Internet
  • Generally both will “accept” connections from both types of browsers
  • We generally pen-test mobile sites from desktops

• Common Real World Result:
  • Primary website highly secured
  • Mobile site unprotected
Common Mobile Portal Mistakes

• Using a different SLD
  • Bank.mobilecorp.com
  • Mobilecorp.com/bank

• Massively sets back fight against phishing

• Users need to be taught to:
  • Only go to your SLD
  • Use HTTPS
  • Not click on email links

• Use one standard for the Enterprise
  • I like m.*
Common Web Portal Mistakes

• Poor Crypto Practices
  • You do not want to allow for proxied TLS
  • W-TLS, old phones, Opera Mini
  • Need to blacklist old browsers by User-Agent

• Do not mix HTTP/HTTPS
  • Mobile phones are always on insecure networks
  • Even desktop browsers handle this poorly
Mobile Web - Authentication

- Most mobile sites use www creds

- Bad idea
  - Users downgrade their credentials
  - Mobile phishing is still easier
  - Eliminates ability for per-browser auth

- One option:
  - Shorter “mobile PIN” for m.*
  - Limited functionality with this PIN
Mobile Web - Authentication

- Mobile sites destroy best anti-fraud weapon, user analytics

- For example, the iPhone:
  - Roaming AT&T IP
  - Same User-Agent
  - Much more difficult geo-location

- Many browsers don’t support persistent cookies

- No flash cookies
Authentication

- This problem is much easier with a thick app:

  - User, Pass + Request for PIN
  - One time PIN
  - www.bank.com

  - One Time PIN
  - Crypto Key
  - Key(Request)
  - m.bank.com
Choices

• So should I build a thick app? Big question these days...

• From a security perspective, thick apps help with:
  • Authentication
  • Fraud analytics
  • Crypto

• Thick client apps can introduce flaws, so you need to be mindful
  • Still, the sandbox on phones is better
  • Most phones have anti-overflow technologies
Actions
For Enterprises

- Define a Mobile Application Security Policy
- Set User Application Security Policy
  - Are App Stores Allowed?
- Build Secure Line of Business Applications
- Create a Unified Model for Mobile Interactions
  - Don’t mix “m.” with /mobile or .mobi domains
- Be firm on enforcing access to your network from random devices
For Developers

- Define Security Assertions for Users
- Define Threats
  - Lost Phone
  - Network Attacks
- Create Limits
  - E.g. Read-only Mobile Endpoints
- Apply Secure Development Guidelines
- Test on Real Devices
For Mobile Web Developers

- Disallow Older Browsers
- Do Not Decrease Overall Security
  - Tightly-Scope Functionality
  - Use SSL and Proper Domains
- Strong Authentication
  - Unique Authentication for Mobile Sites
- Don’t Make Phishing Easier
  - Keep Links out of Email
  - Maintain Clear Message
Questions?
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