Mobile Applications Security

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The smartphone revolution

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- Although there is no formal definition of "smartphone," an informal definition is that smartphones are mobile phones that have advanced computing capabilities (often approaching those of PCs)
- The number of smart phone users around the world is unknown
- One study shows that sales of smartphones are increasing by 15 percent every year
- Trend—increasing use of smartphones intended for business for personal reasons instead

Smartphones: A target-rich environment for attackers

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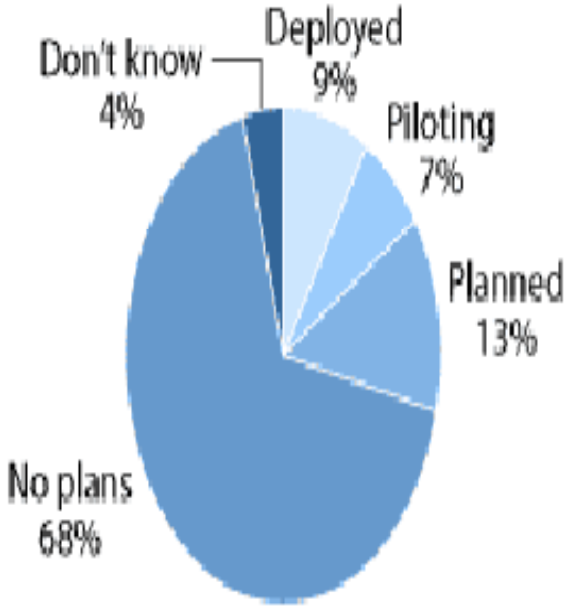
- Statistics from the UK Department of Trade and Industry-backed Information Security Breaches Survey show that more than half of the companies surveyed do not have *any* controls in place for securing company information on smart phones
- Although more organizations have smart phone policies than two years ago, comparatively few companies have invested in technology to manage and protect these devices



Base: 112 North American companies
(percentages do not total 100 because of rounding)

Smartphone applications: "Where the action is"

- Types of functionality include
  - Controlling or interacting with appliances that are part of the corporate network
  - Monitoring and/or remotely controlling desktop computers and/or Web servers
  - Monitoring and troubleshooting remote networks
  - Personal use
- Most are free
- Major limitation: small size of smartphone's screen

Kinds of applications available

- Accounting
- Books
- Business
- Chat
- Cookbooks
- Educational
- Energy
- Entertainment
- Finance
- Games
- Gardening
- Health and fitness
- Lifestyle
- Music
- Navigation
- Network troubleshooting
- Photography
- Productivity
- Reference services
- Religious
- Social networking
- Sports
- Travel
- Utilities
- More…

Examples of iPhone applications

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- 101 Cookbooks
- goMovies
- iPhlickr
- iPhoneDigg
- iActu
- Gas.app
- iZoho
- Google Reader
- iPhoneChat
- OneTrip Shopping List
- BumpIt
- Much more…

Security issue: “Jailbreaking” iPhones (1)

- When an iPhone is installed, it stays in a “factory state”
  - Intended to be changed only as the result of Apple upgrades
- To install some applications on an iPhone, it is necessary to “jailbreak” the phone
- Jailbreaking means overwriting the phone’s firmware to
  - Install application bundles
  - Unlock baseband firmware that keeps the iPhone from doing things such as connecting to another service provider’s 3G network

Security issue: “Jailbreaking” iPhones (2)

- Jailbreaking may not sound like a big deal, but it:
  - Voids the iPhone service warranty
  - Produces numerous changes in the iPhone that may cause the best of iPhone forensics efforts to be thrown out in a court of law
  - Can expose the iPhone to a wider range of attacks

Vulnerabilities in smartphone applications (1)

- Because applications are intended for single-user contexts, there is little or no authentication and authorization in most smartphone applications
- Password-related vulnerabilities
  - Default passwords
  - If there is a password, it is likely to consist of very few characters
- Several critical security functions are almost always missing
  - Data encryption
  - Auditing
  - Security indicators (e.g., padlocks) on Web browsers
  - Security updates

Vulnerabilities in smartphone applications (2)

- Ability of applications to
  - Access any file on the smartphone
  - Do anything they want to do to the operating system with full privileges
  - Drain a smartphone's battery, causing denial of service
- It is almost impossible to determine whether or not smartphone applications are malicious until you download them
- One recent study showed that mobile device users are even more susceptible to phishing than normal desktop computer users!

Major security controls for smartphones (1)

- Appropriate policy and standards
- Using anti-virus and anti-spyware software
- Remediation of vulnerabilities
- Strong authentication
- Encrypted network transmissions through VPNs, SSH, SFTP, and more
- Secure Wireless Application Protocol (WAP) gateways

Major security controls for smartphones (2)

- Personal firewalls
- Hard drive encryption
- Regular backups
- User security training and awareness
- More…

Major types of built-in security controls for smartphone applications

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The truth about security controls for smartphone applications

- Most mobile application developers do not consider security at all when they code
- Almost no information about the security of mobile applications exists
  - The most widely used security model is very deficient
  - Security standards? Where are they?
  - Most mobile applications have not been tested for vulnerabilities
- Exception: Windows Mobile-based smartphone applications
  - Digital code signing for proof of each application's origin
  - Logo certification—validation that an application meets Windows Mobile implementation guidelines

Trust and privilege levels in Windows Mobile application security

- Privileged vs. unprivileged execution mode—determines application's access level to smartphone features and application programming interfaces (APIs)*
  - Privileged trust—full access to the system and APIs
  - Unprivileged trust —limited access to the system and APIs
- Untrusted applications *cannot*
  - Be loaded on a smartphone
  - Access the operating system and APIs
- The operator can select a security policy that can
  - Make untrusted applications run with unprivileged access
  - Require that applications be digitally signed

* - Certificates are stored in two certificate stores, one for privileged execution mode, the other for unprivileged mode

Type of certificate required for each privilege level

Policy	Unprivileged execution mode	Privileged execution mode
Unrestricted	None	None
Standard certificate	None	Operator privileged certificate required
Restricted certificate	Mobile2Market unprivileged certificate required	Operator privileged certificate required

The bad news (1)

- Certificate-based code signing has proven itself to be a weak method of countering malicious code
  - Is at best an *indirect* method of protecting against malicious code execution
  - Forged certificates are a constant concern
  - When a dialog box asking users if they want to continue executing a program, they almost always say “yes,” no matter what
  - Is the method used with ActiveX controls

The bad news (2)

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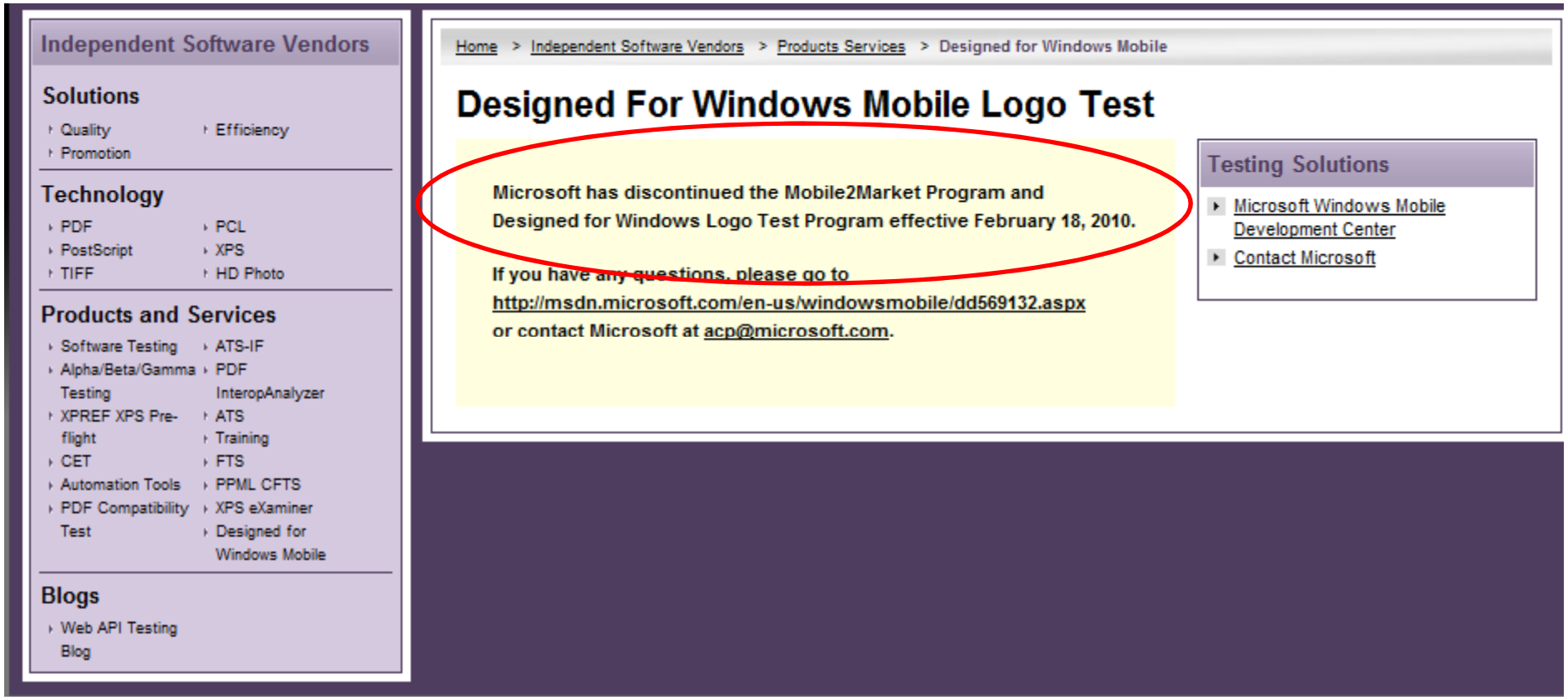

App Stores: Do they Help Security?

- All state that they screen applications, but no specifics are provided
- Informal evidence suggests that
  - The Apple iTunes App Store is more concerned about potentially offensive application content than anything else
  - The BlackBerry App World cares mostly about applications causing BlackBerrys to crash or hang
  - Symbian's application screening consists only of virus scanning
- It is easy to bypass App Stores when downloading mobile applications

The “bottom line”

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- An increasing percentage of critical business processes involves use of mobile devices
- The use of mobile applications per se is *not* usually a major security risk, BUT
  - If vulnerabilities in them are exploited, mobile devices, data stored on them, and networks that can be reached through them can be compromised
  - Use of many mobile applications can be a violation of an organization’s acceptable use policy
- Also consider mobile computing in regulatory compliance risk management

So where do you start re. smartphone application security? (1)

- Find out as much as you can about
  - The type and range of applications your organization's mobile phone users are using
  - Vulnerabilities and security features in these applications
  - Applications that may have better security than currently used or candidate ones
- Start including mobile computing in the risk management process
  - Asset inventory
  - Threat and vulnerability analysis
  - Risk analysis
  - Controls selection and implementation
  - Controls evaluation

So where do you start re. smartphone application security? (2)

- Begin creating
  - Policy provisions that address mobile computing operating system and application security risks
  - Security standards for mobile computing operating systems and applications
  - Preliminary audit procedures

Conclusion

- Achieving adequate levels of security with mobile devices and applications is a very difficult task
- A good starting point in controlling smartphone-related security risk is focusing on
  - Risk assessment
  - Policy and standards
- Final suggestion—also begin preparing for when your organization starts developing *its own* mobile applications!

Questions?

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