Detecting In-Flight Page Changes with Web Tripwires

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Found Diverse Changes

- Page leaves server over HTTP
- Ad Injection
  - NebuAd, MetroFi, etc.
- Traffic Reduction
  - Image distillation
- Forced Page to be Cacheable
  - Removed certain meta tags
- Security Checking Scripts
  - BlueCoat Web Filter
- Popup Blocking Scripts
  - Personal firewalls, etc.
- Ad Blocking Scripts
  - Ad Muncher, Proxomitron
- Adware
  - Injected mouse-over ads
- Worms
  - Exploits spread over LAN

Injected Ads?
- Recent reports that ISPs inject ads into web pages

Measuring In-Flight Page Changes

- We built a Web Tripwire:
  - JavaScript code on a web page
  - Runs within the client’s browser
  - Detects in-flight HTML changes
  - Reports changes to user and server

- Needed wide exposure:
  - Posted to Slashdot, Digg, etc.
  - Visits from over 50,000 clients
  - 650 clients saw changes (1.3%)
  - Many bad for publisher or user

Bugs and Vulnerabilities

- Some changes inadvertently broke the page
  - JavaScript stack overflows from ISP-based changes
  - Client firewalls interfered with MySpace, web forums

- Some changes made page vulnerable to XSS attacks
  - Some ad blockers allowed script injection via URL
  - Affected most or all of user’s pages, like a root exploit

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Negative for Publishers

- Injected ads can track and annoy visitors
- Less control over whether page is cached
- Ad blockers may affect revenue stream
- Some changes break pages or expose visitors to attack

Web Tripwire Toolkit

- Publishers may wish to detect such changes to their pages
- HTTPS is costly and rigid

- Web Tripwires can help:
  - Detect most changes at low cost, with current browsers
  - Notify user, debug problems, offer guidance
  - We offer a configurable toolkit for easy deployment

Measurement Tool and Web Tripwire Toolkit available online: http://vancouver.cs.washington.edu