AT&T Developer Program: devCentral Webcast Series

Mobile Web 2.0: Dramatic Developments in Mobile Web Technology

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Pantech Matrix Pro

Samsung Jack

Nokia E71x

BlackBerry® Bold

BlackBerry® Curve 8900

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Mobile Web 2.0 Technologies

Peter Rysavy
President
Rysavy Research, LLC

Agenda

- Native applications versus Web applications
- Web 2.0 overview
- Mobile Web 2.0 technologies
- Features of leading browsers
- Open Mobile Terminal Platform BONDI
- Widget frameworks
- GSMA OneAPI
- Security considerations
- Development recommendations
- Conclusion

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Native versus Web

	Native Application	Web Application
Application Responsiveness	Excellent.	Good with 3G and Wi-Fi, and getting better with faster networks and new technologies such as Ajax, Gears, HTML 5.
Capabilities	Excellent with access to device information and hardware.	Good to excellent. New specifications, such as BONDI, will provide access to device information and hardware.
Development	Very high learning curve.	Can leverage common Web tools and techniques.
Multi-Platform Support	Separate versions required for each platform unless using Java or mobile middleware.	Web content can operate across multiple platforms, although browser features can vary.
Offline Operation	Excellent.	Biggest limitation today, but being addressed by BONDI, Gears, and HTML 5 offline operation.
Security	Complex set of considerations with concern about local data and firewall traversal.	Some advantages with server-side storage of sensitive data and easier HTTP firewall traversal.

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Web 2.0

Web 2.0 means many things:

- The Web as the application platform.
- Improved user experience.
- Faster, more efficient Web applications.
- Services, not packaged software.
- Mashup capabilities.
- Free services paid through by advertising.
- Users as co-developers.
- User-generated content.
- Customer self-service.

Web 2.0 incorporates an ever-evolving array of technologies, development methodologies, and services models:

- CSS, REST/XML APIs.
- JSON data interchange.
- Semantically valid XHTML/HTML markup.
- Rich Internet Application (RIA) techniques, e.g., via Ajax, Adobe Flex, Microsoft Silverlight.
- Syndication, aggregation, notification of data in RSS or Atom feeds.

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Mobile Browser Capabilities

Mobile browser capabilities encompass minimum set supported on all AT&T phones, plus additional capabilities on top-tier phones such as smartphones.

1. All phones:
   - OMA Browsing based on WAP architecture, XHTML Mobile Profile, ECMAScript Mobile Profile, Wireless Cascading Style Sheets, Binary XML, OMA Push
   - V2.2 most phones, V2.3 emerging, V2.4 latest specification
   - Content must be designed for mobile devices
2. Top-tier phones:
   - Native and third-party browsers (e.g., Firefox, Opera)
   - Capabilities often comparable to desktop browsers
   - Ability to render nearly all Internet content
   - Many applications/services possible

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High-End and Emerging Features

High-end mobile browsers adopting most of the capabilities being found in desktop browsers.

Technology	Summary
Ajax	Asynchronous retrieval of data.
Offline Operation	Application interaction with local version of data.
Faster JavaScript	Enablement of sophisticated applications.
Video	Increasing number of Web formats supported, e.g., Flash.
Desktop Integration	Seamless handover of sessions between desktop and mobile, e.g., Firefox provides for handover via cloud of sessions, tabs, cookies, favorites, passwords.
Device and Network Capabilities	Emerging standards such as OMA Device Profile Evolution (DPE), BONDI, and OneAPI provide access to device and network information/functions.
Developer Tools	More powerful Web tools, e.g., Google Web Toolkit for converting Java to JavaScript, available for Android and iPhone.

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Ajax

Enables “rich Internet applications.”

E.g., selective page update, mouseovers.

Supported by most smartphone browsers.

AJAX derived from “Asynchronous JavaScript and XML”

Ajax is same concept without specifying exact technologies.

Usually implemented with:

- XHTML and CSS – presentation
- Document Object Model – method for storing pages allowing programmatic access
- XML and XSLT – data interchange and display, alternatively JavaScript Object Notation (JSON)
- XMLHttpRequest (XHR) – asynchronous communications
- JavaScript – programming

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Offline Operation

Web application does not have to stop working with loss of connection.

BONDI Filesystem API

- Open, full-featured API enabling file system access
- Available today as a Windows Mobile based reference implementation
- Being expanded to support LIMO, Android, other platforms

Gears

- Google initiated open source project
- Offline data with synchronization once connected
- Supported on Android and Internet Explorer
- Forthcoming on BlackBerry (5.0 handheld release) and Opera Mobile 9.5
- Additionally, worker-pool API allow JavaScript threads to execute without blocking the UI

HTML 5

- Section 5.8 Offline Web applications
- Application cache

BlackBerry:

- Form queuing allowing operation even out of coverage.
- Will support Gears

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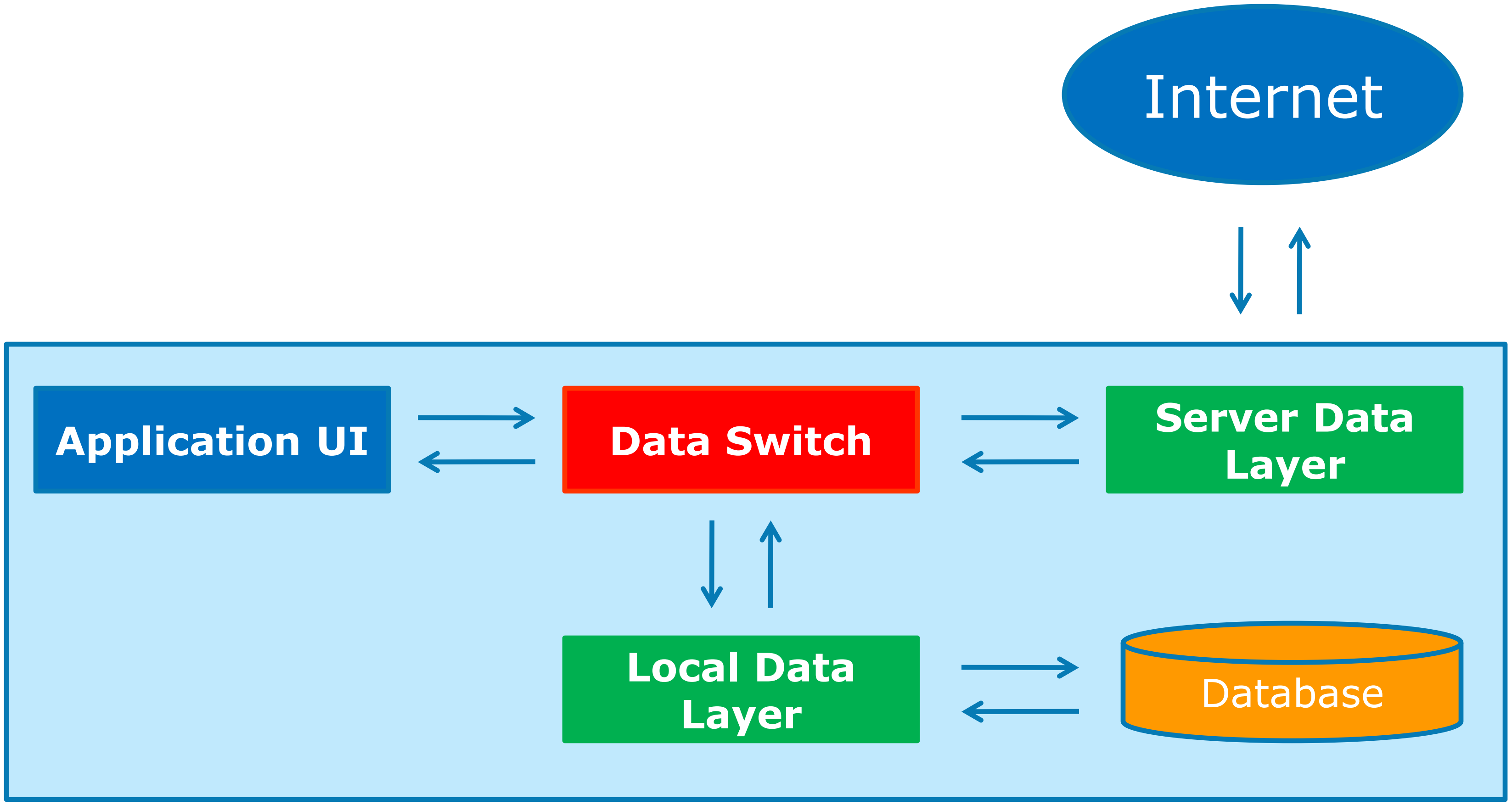
Gears Architecture



http://code.google.com/apis/gears/architecture.html

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Rich Internet Application Frameworks

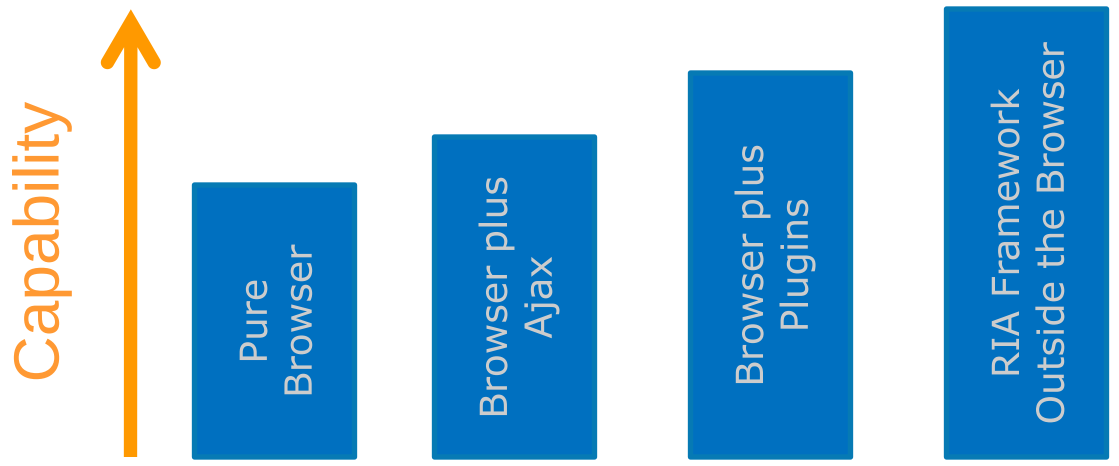
Framework that operates above the OS layer.

Provides consistent runtime execution environment for Internet applications.

Most support sophisticated multimedia, including video.

RIA frameworks can be deployed:

- As OS extensions (e.g., Microsoft .NET RIA that uses Silverlight)
- As native applications (e.g., Adobe AIR).
- As plug-ins for high-end browsers (e.g., Adobe Flash).
- In conjunction with Java VM (e.g., Java FX)



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HTML 5

Development:

- Originally called Web Applications 1.0
- Work by W3C and Web Hypertext Application Technology Working Group (WhatWG)
- First public working draft of specification Jan 2008; completion expected 2012

Key Features:

- Better page structuring through new elements (e.g., section, header, footer, section, article, nav and dialog)
- Canvas element with 2D drawing API for dynamic graphics and animation
- Direction provision for audio and video content
- Client-side persistent storage (key/value and SQL)
- Offline application APIs
- Editing and drag-and-drop APIs
- Network Web Socket API
- Cross-document messaging

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Features of Leading Mobile Browsers

Mobile Browser	Platforms	Rendering Engine	Ajax	Gears	Flash	Widget Engine	Comments
Android	Android	WebKit	Yes	Yes	Forthcoming	No	
Apple Safari	iPhone	WebKit	Yes	No	No	No	Excellent at rendering and navigating overall Web.
BlackBerry	BlackBerry	Mango	Yes	Forthcoming	No	Yes	Also includes BlackBerry security architecture, push capability, optimization.
Firefox	Mobile Linux, Windows Mobile, Symbian	Gecko	Yes	No	Yes	Yes	Not released. Expected Q2 2009. Synchronization between desktop/mobile sessions.
Internet Explorer	Windows Mobile	Trident/MSHTML	Yes	Yes	Yes	No	Silverlight support planned by Microsoft.
NetFront	Mobile Linux, Symbian, Windows Mobile, other		Yes	No	Yes	Yes	
Opera Mobile	Symbian S60, UIQ, Windows Mobile	Presto	Yes	Forthcoming	Yes	Yes	Opera Mini provides support for many other platforms.
Symbian S60	Symbian S60	Symbian S60	Yes	No	Yes	Yes via Nokia Web Runtime	Silverlight support planned by Microsoft.

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Web Standards Bodies in a Mobile Context

W3C:

- Main international standards organization for Web standards.

Open Mobile Alliance (OMA):

- Specifies mobile service enablers to ensure interoperability.
- Has browsing specifications/recommendations.

Open Mobile Terminal Platform (OMTP):

- Goal is to simplify customer experience of mobile data services and to improve mobile device security.
- Does not develop standards, but does issue requirements and specifications such as BONDI.
- Member of W3C. Can make submissions to W3C activities that affect BONDI.

GSMA (Global System for Mobile Communications Association):

- Represents operators and mobile ecosystem providers.
- Develops recommendations including OneAPI.
- Liaison/collaboration with OMA and OMTP BONDI. OMA will develop specifications for OneAPI.

Parlay Group

- Develops telecom APIs.
- Parlay X 3.0 specification defined jointly between the European Telecommunications Standards Institute (ETSI), Parlay, and the Third Generation Partnership Program (3GPP). Now managed by OMA.

OpenAjax Alliance

- Goal of successful adoption of open and interoperable Ajax-based Web technologies.
- Provides feedback on projects such as BONDI.

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BONDI

Bryan Sullivan
Lead Member of Technical Team
AT&T Service Standards

BONDI Initiative

A program of the Open Mobile Terminal Platform (OMTP).

Developed in collaboration with W3C's WebApps working group.

Core members of this group are operators

- AT&T, Hutchison 3G, Orange, Telefonica, Telenor, TIM Telecom Italia, T-Mobile and Vodafone.

Actively supported by a wide range of network and device vendors.

Standardizes access to a wide range of device features:

- Local-application invocation, messaging (SMS, MMS, e-mail), local file I/O, phone status (e.g., signal strength), contacts, location, and camera.

Enables security through configurable policies, certificates and BONDI compliance certification.

- Independent testing labs will test and verify BONDI web services and widgets for security and functionality for certificates to be issued.

Status: Version 1.0 released June 2009. BONDI developer Website has information, SDK, and reference implementation available at http://bondi.omtp.org.

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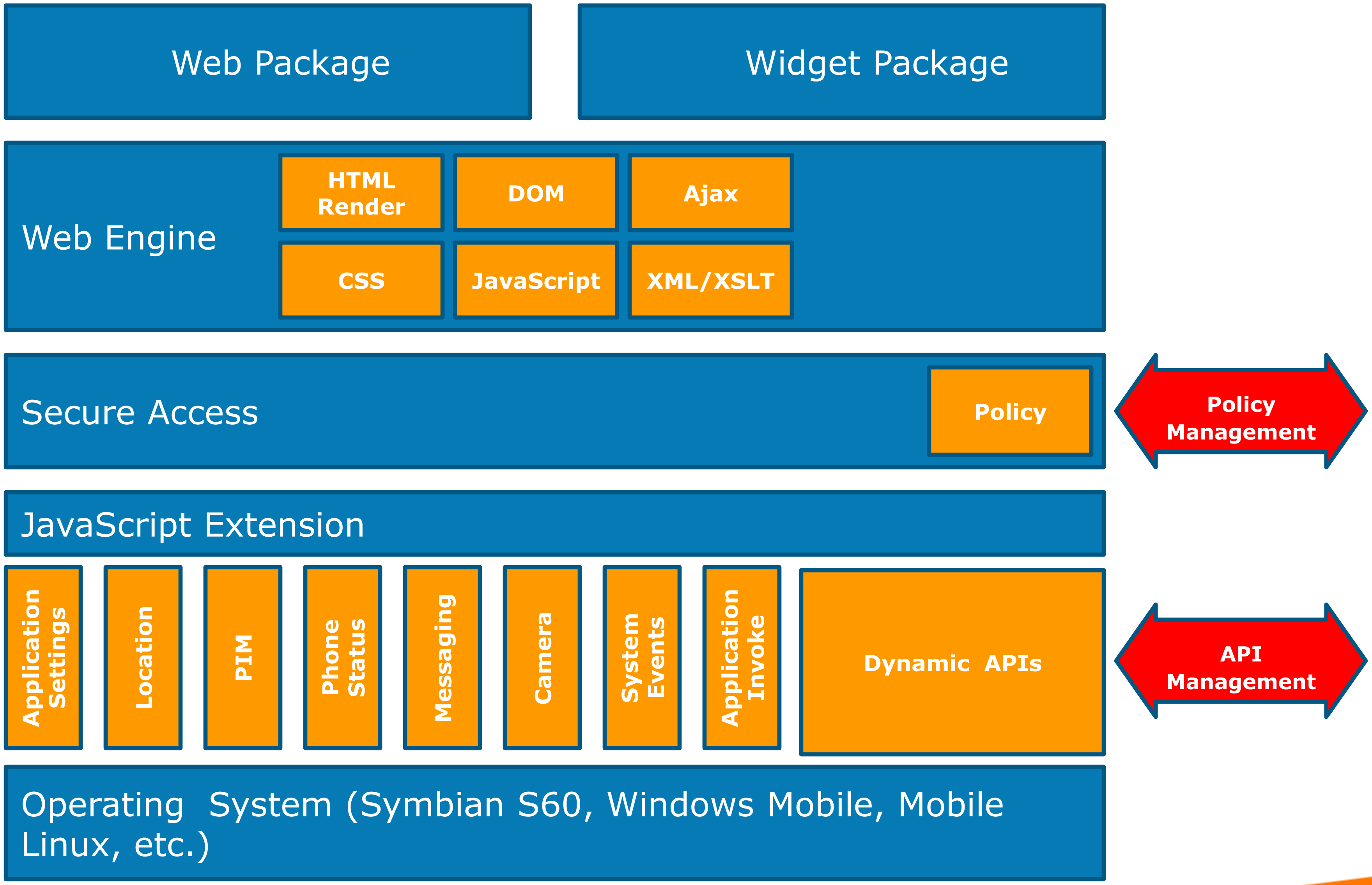
BONDI Architecture



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BONDI API Example: File System Access

Package org.omtp.bondi.filesystem methods

Interface	Method
FileSystemSuccessCallback	void onSuccess(File file)
FileSystemManager	DOMString getDefaultLocation(DOMString specifier, unsigned long minFreeSpace) StringArray getRootLocations() File resolve(DOMString location) void registerEventListener(FileSystemListener listener) void unregisterEventListener(FileSystemListener listener)
FileSystemListener	void mountEvent(DOMString location) void unmountEvent(DOMString location)
File	FileArray listFiles() FileStream open(DOMString mode, DOMString encoding) PendingOperation copyTo(FileSystemSuccessCallback successCallback, ErrorCallback errorCallback, DOMString filePath, boolean overwrite) PendingOperation moveTo(FileSystemSuccessCallback successCallback, ErrorCallback errorCallback, DOMString filePath, boolean overwrite) File createDirectory(DOMString dirPath) File createFile(DOMString filePath) File resolve(DOMString filePath) boolean deleteDirectory(boolean recursive) boolean deleteFile()
FileStream	void close() DOMString read(unsigned long charCount) ByteArray readBytes(unsigned long byteCount) DOMString readBase64(unsigned long byteCount) void write(DOMString stringData) void writeBytes(ByteArray byteData) void writeBase64(DOMString base64Data)

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Widget Framework Overview

Widget frameworks provide a “chrome-less” execution environment for user-installed web applications based upon Web technologies:

- HTML, Ajax, JavaScript and CSS.
- W3C-standard widgets are packaged in a format understood by web developers (web pages + media assets and referenced scripts).

Widgets typically provide focused, single-purpose Web applications that can be more appealing or easier to use than the browser.

- Widget can actively present information on the “idle” screen, or be easily executed in an application menu, or as an icon on the “idle” screen.
- Downloaded, then available without needing subsequent downloads.

Many frameworks are in development or available—addressing potential fragmentation is the primary goal of BONDI and W3C.

- Browser supported: Access Netfront, Opera Mobile, Symbian S60, Obigo
- Handset specific: Motorola, Windows Mobile 6.5
- Popular downloadable frameworks: Nokia Widsets, Yahoo Go!
- Others: Aplix WebVM, JIL, Bling, Mojax, Plusmo, Snaptu, Spime, Webwag, SurfKitchen

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Widget Frameworks

Item	Details
SDK	Widget emulator, device API simulators, JavaScript debuggers, CSS and DOM inspectors, XHRT/HTTP loggers/debuggers.
Administrative Tools	Certification/signing; capabilities for widget polling, notification, updates, revocation.
Widget Client	Widget runtime. Separate executable or part of browser.
Web Sites	Public- or operator-hosted Web sites that contain a library of widgets for that framework.

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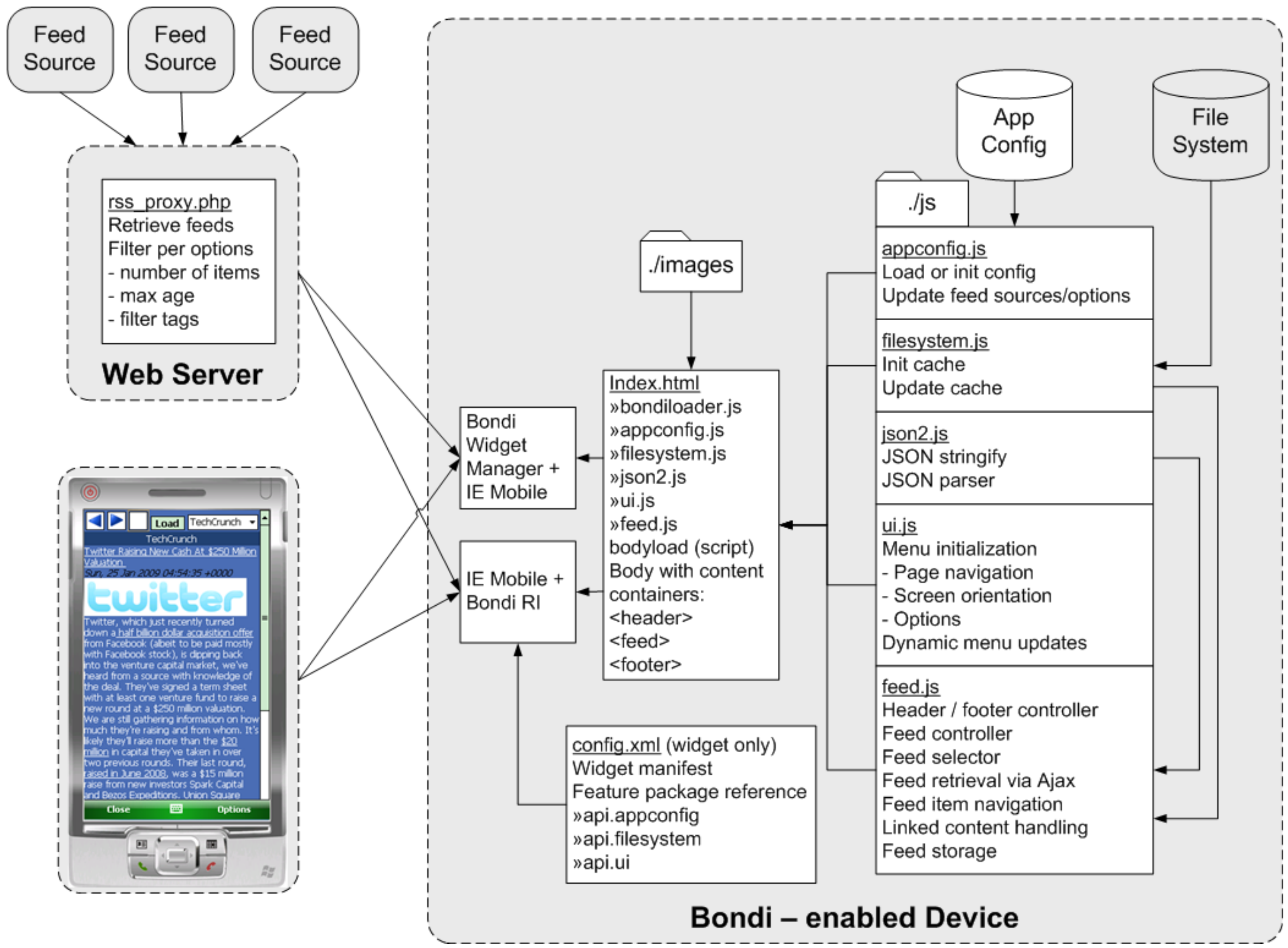
Example BONDI Test Widget



Packaged per W3C as a zip archive. When installed, unpacks to a directory with root files index.html and config.xml. Other files can be included per application design.

This example includes Javascript files for:
- Configuration
- Filesystem (caching)
- JSON parser
- User Interface (e.g. buttons, menus)
- RSS feed selection / retrieval / navigation.

It uses a server PHP script for RSS feed retrieval, simplifying network access policy requirements.

Get more at: http://bondi.omtp.org/widget-gallery/default.aspx

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GSMA OneAPI

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Aepona

What is OneAPI?

- A GSMA initiative to standardize Open Network APIs
- Participation from leading operators across the globe
- Input from application and content community
- Both technical & commercial objectives

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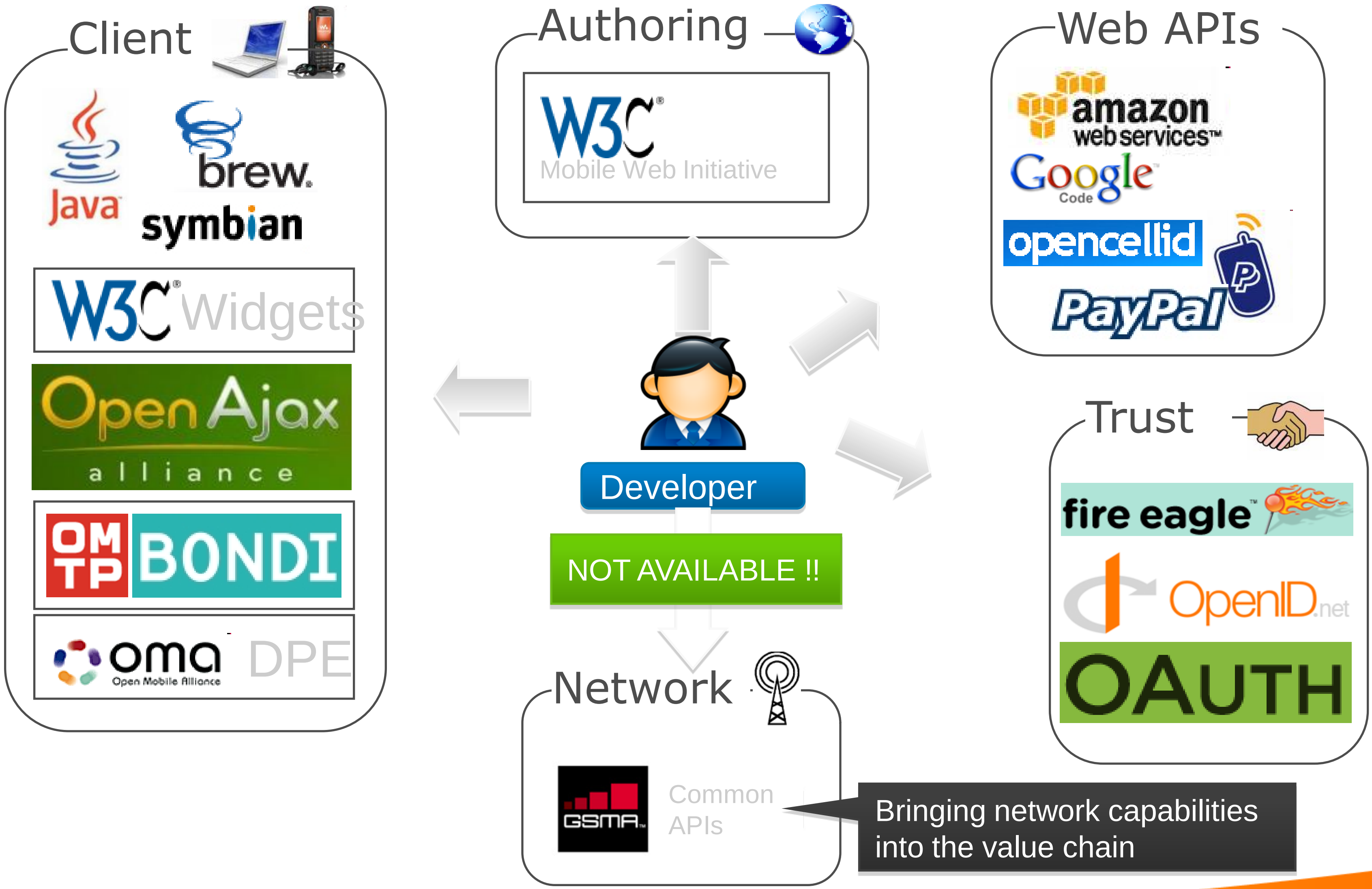
Network APIs missing from ecosystem….



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The importance of common APIs

Current Barriers to Market

Authentication Network APIs $Reconciliation SLAs/Policies

n operators….

- Reduce fragmentation and barriers to entry
- Present a common industry standard to put network enablers in the API ecosystem and stimulate innovation
- Open new revenue streams for App Developers

POWERED BY AEPONA

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Key Project Deliverables

Year 1

- Developer oriented APIs
  - Enablers for the Network Services applications need
  - New RESTful definitions
- Capture market requirements
  - Portal for App Developers to access API
  - Forum to capture feedback
- Reference Implementation
  - Aepona launched the demo platform at MWC 2009
  - 12 Operators currently integrated
  - MANY others interested/pending
    - Including

Year 2

- Iterate and evolve APIs to ensure quality and relevance
  - Continue Operator Integration
  - Feedback from development community
- Grow developer support
- Discuss & define business model
- Commercial Launch!

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OneAPI – Phase 1 Functionality

Function	Description
Short Messaging	Send or receive SMS, WAP Push.
Multimedia Messaging	Send or receive MMS.
Location	Determine the current physical location of a user/device.
Payment	Charge a user for an application via the operator (bill/pre-pay account).

Check out the Reference Implementation
http://oneapi.aepona.com

twitter @OneAPI

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Security Considerations

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Lead Member of Technical Staff
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Security Overview

Asynchronous Java + DOM Security has two stories:

- How do I protect data that is stored on my Web server?
- <u>How do I protect my customer’s Web experience?</u>

Security considerations for protecting customer’s Web experience:

- Session hijacking & cookie theft are en vogue
  - Cross Site Scripting (XSS)
  - Cross Site Request Forgery (CSRF)
  - Click-Jacking
- Security can be enforced via Secure Development Lifecycle processes or application-aware intrusion prevention systems/firewall
  - Validate all user input
  - Consider Turing tests
  - Make sensitive requests to methods session-dependent

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Web Application-Level Security

Web application developers should ensure their applications/sites are not vulnerable to various forms of attack.

Cross Site Scripting (XSS)

- Vulnerabilities emerge when un-escaped user data, such as malicious JavaScript, is included in HTML output.
- Vulnerabilities can be non-persistent, persistent or DOM-based.

Cross Site Request Forgery

- Exploits trust that site has for a user's browser (XSS is reverse.)
- Vulnerability is a Web application that performs an action from an authenticated user without requiring user authorization, under the control of a third party, e.g., clicking on malicious image.

Click Jacking

- Users tricked into interacting with a "transparent" Web page, clicking on visible buttons, but performing actions on the hidden page.

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OWASP Top 10

1. Cross Site Scripting
2. Injection Flaws
3. Malicious File Extension
4. Insecure Direct Object Reference
5. Cross Site Request Forgery
6. Information Leakage & Improper Error Handling
7. Broken Authentication & Session Management
8. Insecure Cryptographic Storage
9. Insecure Communications
10. Failure to restrict URL access

Open Web Application Security Project

http://www.owasp.org/index.php/Top_10_2007

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Security Summary

Security for Web 2.0 apps is about both the client and the server.

Validate user input!

Assess whether method requests are authentic--i.e., that your customer really **is** accessing a method on your server, and not inadvertently accessing it because they’re a victim of a CSRF attack.

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Recommendations

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High-Level Recommendations

- Determine whether Web, native or hybrid application is best suited.
- Decide on whether to use mobile-specific content.
- Realize that not all advanced features work for all browsers (e.g., Flash not supported on all browsers).
- Optimize high-usage applications for specific devices and browsers using advanced Web technologies.
- Research capabilities of target browsers.
- Consider designing other applications operating on a lowest-common denominator model.
- Take advantage of broadly supported, standard-based initiatives such as BONDI and OneAPI.
- Test in variety of conditions and locations to assess effects of mobility, 2G vs. 3G operation, varying network conditions.
- Implement appropriate device management, policy control and security mechanisms.

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Mobile Web Content Design

General considerations

- Mobile usage often different from desktop usage
- Provide fast access to most needed information

Small screen size considerations

- Same content as desktop but with different CSS styling
- Same content but transformation via XSLT
- Mobile specific content (different URL, user agent sniffing)

User input limitations

- Different devices have different types of keyboards
- Different users have different text entering skill levels

Fast loading

- Minimize number of resources needed
- Use Ajax to intelligently prefetch information

Comply with W3C Mobile Web Initiative best practices

- Best Practices 2 is currently available as draft.

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Conclusion and Call to Action

- ✓ Mobile Web technologies are increasingly powerful.
- ✓ On higher-end phones, many desktop browser capabilities becoming available.
- ✓ Web applications increasingly an effective alternative to native applications, following general Internet trends.
- ✓ Key technologies and capabilities include Ajax, off-line operation, device/network information, faster JavaScript, video, desktop browser integration, push, better tools.
- ✓ Widget frameworks provide users fast intuitive access to web-based information.
- ✓ Standardization efforts such as OMA specifications, OMTP BONDI and GSMA OneAPI further increase functionality of Web applications.
- ➢ Select platforms and browsers based on needed capabilities.
- ➢ Exploit Web technologies where most effective.

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References

devCentral Web 2.0 Content

http://developer.att.com/mobileweb

http://developer.att.com/webcasts

Other resources:

W3C Mobile Web Best Practices Working Group
http://www.w3.org/2005/MWI/BPWG/

Open Mobile Terminal Platform BONDI
http://bondi.omtp.org

OMA Browsing v2.2, v2.3, v.2.4
http://www.openmobilealliance.org/Technical/release_program/browsing_v2_2.aspx
http://www.openmobilealliance.org/technical/release_program/browsing_v23.aspx
http://www.openmobilealliance.org/technical/release_program/browsing_v24.aspx

HTML 5 Features Relative to HTML4
http://www.w3.org/TR/html5-diff/

Mobile Internet Explorer
http://msdn.microsoft.com/en-us/library/bb159715.aspx

GSMA OneAPI
https://gsma.securespsite.com/access/default.aspx

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CONTEST

Question: Which of the following is not a Mobile Web 2.0 technology?

A: Ajax
B: Faster JavaScript execution
C: Offline operation
D: Rich Internet application frameworks
E: C++ native application
F: BONDI
G: Mobile widgets

Send answers to:
devCentral-biz@awsmail.att.com
Winners will be selected randomly from correct responses

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Questions and Answers

Webcast slides will be posted shortly on
http://developer.att.com/webcasts

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