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CONTENTS INCLUDE:

- Basics: What is a Viewport
- Mobile URLs
- High Resolutions Support
- Mobile Icons
- Touch Events
- Offline Support... and more!

HTML5 Mobile Development

By: Max Firtman

The HTML5 umbrella covers a vast range of specifications, APIs, techniques, and design approaches to web development. Several of these technologies are intended to help developers build web applications optimized for mobile devices. Not all platforms support the same features in the same way, however. Moreover, specific hardware differences often require special treatment beyond the W3C spec, no matter how the platform implements the spec.

This Refcard is intended to bring you up to speed, and help you jump head-first into mobile HTML5 development. The card first covers the most important HTML5 mobile technologies, including key variations by platform and device, then offers a cream-of-the-crop selection from the vast ecosystem of tools, frameworks, and communities that have sprung up to support mobile HTML5 development. The card assumes basic knowledge of core web development technologies (JavaScript, HTML, CSS).

BASICS: WHAT IS A VIEWPORT?

A viewport allows us to normalize different devices to get the best sizes for a mobile website or webapp and to avoid initial zooming.

All platforms support viewport definitions through <meta> tags:

```
<meta name="viewport" content="{comma-separated options}">
```

The most useful version is:

```
<meta name="viewport" content="width=device-width">
```

Viewport options

Option	Values
width	Width of the virtual viewport that the browser will expose to our website in CSS pixels or the constant device-width
height	Height of the virtual viewport that the browser will expose to our website in CSS pixels or the constant device-width
user-scalable	no/yes
initial-scale	Float value (1=no zoom)
minimum-scale	Float value
maximum-scale	Float value
target-densitydpi	Integer value (70 to 400) in DPI or one of the following constants: device-dpi, high-dpi, medium-dpi, low-dpi. Not available on Safari for iOS

Viewport Through CSS
Internet Explorer since v10 also supports @viewport on CSS:

```
@-ms-viewport {
    width: device-width;
}
```

On Windows 8, including tablets, IE can work in snap state. We can define the viewport only when in this mode:

```
@media screen and (max-width: 400px) {
        @-ms-viewport { width: 320px; }
}
```

Device-Width Values
When using width=device-width as the viewport's width, the final width that we'll have available may be (measured in CSS pixels):

Option	Values
320	The most common value on smartphones including iPhone, Windows Phone, Android (medium screen sizes < 4")
360	Large screen Android smartphones (< 5"), such as Galaxy SIII & SIV
400	Phablets (>5"), such as Galaxy Note
600	Small tablets
768	Large tables

Even on high-resolution screens, such as Retina displays, you will always get a width in CSS pixels with a value of 320. Therefore, the available width for the canvas is the same for all devices.

Landscape viewport
Safari for iPhone will not use the available space on the viewport on landscape and it will zoom in the content. To avoid this behavior we can use the code on https://gist.github.com/901295

MOBILE URLS

Using standard hyperlinks we can communicate with the operating system. Remember to encode in URL format any parameter that you might pass through.

Calls and messaging

To initiate a call, tel:{phone-number}

```
<a href="tel:+14152110022">Call us</a>
```

To initiate an SMS, sms:{destination}?body={message}.
The body might be ignored by some platforms.

```
<a href="sms:1111?body=Hello">Send us SMS</a>
```

To initiate a mail compose, mailto:{to}?subject={subject}&body={message}
iOS supports HTML on the body.

```
<a href="mailto:user@domain.com?subject=Hello?">Send us SMS</a>
```

To initiate a Facetime call on iOS, facetime:{number/user}

```
<a href="facetime:myuser">Call us with Facetime</a>
```

To initiate a Skype call, skype:{user}?call

```
<a href="skype:myuser?call">Call us with Skype</a>
```

To tweet through the native Twitter app, twitter://post?message={message}

```
<a href="twitter://post?Hello">Tweet</a>
```

Maps and Navigation

To open the Maps app on Android and iOS < 6, http://maps.google.com?q={query}

```
<a href="http://maps.google.com?q=golden+gate+bridge">Open Map</
a>
```

To initiate a navigation on Android and iOS < 6, http://maps.google.com?saddr={point1}&daddr={point2}

```
<a href="http://maps.google.com?saddr=golden+gate+bridge
&daddr=Pier+39">Navigate to Pier 39</a>
```

To open the Maps app on iOS >=6, http://maps.apple.com?q={query}

```
<a href="http://maps.apple.com?q=golden+gate+bridge">Open Map</a>
```

To initiate a navigation on iOS >= 6, http://maps.apple.com?saddr={point1}&daddr={point2}

```
<a href="http://maps.apple.com?saddr=golden+gate+bridge
&daddr=Pier+39">Navigate to Pier 39</a>
```

Apple Stores

To open iTunes, AppStore or iBookStore on iOS, generate the link from https://itunes.apple.com/linkmaker

To remove automatic linking

```
<meta name="format-detection" content="telephone=no">
<meta name="x-rim-auto-match" content="none" forua="true">
```

HIGH RESOLUTION SUPPORT

Devices with a high-resolution display (as in Retina iOS devices) will use a multiplier for all your dimensions, known as the device pixel ratio. Therefore, if you draw a 100 pixels element it will measure 100 device pixels on a device with an average screen density, it will be rendered as 200 device pixels on a high resolution device such as iPhone 5, and a 300 device pixels on a ultra high resolution device, such as Samsung Galaxy SIV.

Thanks to the device pixel ratio, our design will look the same in inches on every device, regardless of the screen density.

Using scalar solutions

Using these techniques, our content will render properly on all kinds of screen densities without image quality loss:

SVG: Scalable Vector Graphics
We can use SVG as an external document or as inline using the new <svg> element

Font face
We can use font files for iconography in conjunction with CSS3 Font face. Look at fontello.com and icomoon.io

CSS3
Use CSS3 for effects, gradients, rounded corners and backgrounds

Providing alternate bitmap files

When working with bitmap files (JPEG, GIF, PNG), we can provide different versions of the same file for different resolution. Be careful about the final size for high-resolution devices.

Using background images and media queries
If bitmap images are defined using background images on CSS, we can provide alternate versions using the extension (prefixed) device-pixel-ratio. For devices with a pixel ratio of 2 or more:

```
/* Low resolution version */
#picture {
      background-image: url(picture_low.png);
}

/* High resolution version with different prefixes */
@media screen and (min--moz-device-pixel-ratio: 2),
    only screen and (-webkit-min-device-pixel-ratio: 2) {

          #picture {
                    background-image: url(picture_hi.png);
                    background-size: 100%;
          }
}
```

Using image-set
On Safari for iOS from version 6 we can use the -webkit-image-set function to provide different images from CSS:

```
background-image: -webkit-image-set(
          url(picture_low.png) 1x,
          url(picture_hi.png) 2x
);
```

Using JavaScript
We can query the window.devicePixelRatio property. If it's undefined, we can guess a low-resolution device; if it's a numeric value we can use it to change the image being loaded.

```
var pixelRatio = window.devicePixelRatio || 1;

if (pixelRatio >= 2) {
     document.querySelector("#image1").src = "picture_hi.png";
}
```

MOBILE ICONS

We need to provide different icons for the tab or title area and for the home screen when the user adds an icon to it. Different platforms and devices support different icon sizes.

Window and tab icons

```
<link rel="icon" href="icon_32.png">
<!-- For IE, we need an icon in ICO format -->
<link rel="shortcut icon" href="icon.ico">
```

Home screen icons

```
<-- iPad icons -->
<link rel="apple-touch-icon" href="icons/72.png" sizes="72x72">
<link rel="apple-touch-icon" href="icons/144.png"
sizes="144x144">

<!-- iPhone and iPod touch icons -->
<link rel="apple-touch-icon" href="icons/57.png" sizes="57x57">
<link rel="apple-touch-icon" href="icons/114.png"
sizes="114x114">
```

Other platforms—such as Android, BlackBerry and Symbian—support the apple-touch-icon link with non-standard sizes.

Nokia Symbian also supports:

```
<link rel="nokia-touch-icon" href="icons/54.png">
```

Precomposed icons
By default, Apple will add shadow, rounded corners and 3D shine effects to the icons, as in the following image:

To avoid some of these effects we can use the alternate version

```
<link rel="apple-touch-icon-precomposed" href="icons/72.png"
sizes="72x72">
```

Windows 8 Start Screen Tile

Internet Explorer 10 on Windows 8 supports a "Pin to the Start Screen" feature. We can define the background color and the icon to be used in the Start Screen using:

```
<meta name="msapplication-TileImage" content="icons/tile144.png">
<meta name="msapplication-TileColor" content="#FFFF00">
```

Updating a badge notification
The Start Screen Tile may be updated frequently defining an XML URL through:

```
<meta name="msapplication-badge"
content="frequency=1440;polling-uri={xml-url}">
```

The XML will look like:

```
<?xml version="1.0 ?>
<badge value="30"></badge>
```

UPGRADE TO WEBAPP

A webapp is a hosted website that can be installed with a home screen icon and once installed it works full-screen outside of the browser and it might have some kind of super powers in terms of permissions and support.

iOS Home Screen webapps

On iPhone and iPad we can create webapps using a meta tag and usually adding the apple-touch-icon link:

```
<meta name="apple-mobile-web-app-capable" content="yes">
```

Once added to the Home Screen, a page with the meta tag will open in full screen mode.

We can customize the status bar appearance through one of the possible options on this meta tag:

```
<meta name=apple-mobile-web-app-status-bar-style"
content="{black/default/black-translucent}">
```

Startup images
When the webapp is opened from the Home Screen, we can define a startup image that acts as the image while the webapp is being loaded:

```
<link rel="apple-touch-startup-image" href="startup.png">
```

The image has to be full screen size and because there are several resolutions (iPhone 3GS, iPhone 4S, iPhone 5, iPad Mini, iPad 2) we can use media queries to provide different versions.

For iPhone 5 and latest iPods touch we can use:

```
<link rel="apple-touch-startup-image" href="startup.png"
media="only screen and (device-height: 568px) and
(-webkit-device-pixel-ratio: 2)">
```

We can also provide portrait and landscape versions for iPads using orientation: landscape and orientation: portrait in the media attribute.

Opening links

While in a webapp, all the links are opened in Safari (new window). To open a link and replace the current HTML in our app context, we can use JavaScript as in:

```
<a href='#' onclick='location.href="newfile.html"'>Go</a>
```

Mozilla open webapps

On Firefox for desktop and mobile, including Firefox OS, we can install a webapp using a manifest JSON file and a JavaScript API.

The manifest file looks like:

```
{
"name": "My HTML5 App",
"description": "This is the description of the app",
"launch_path": "/index.html",
"icons": {
"128": "/img/icon-128.png" // >=128 is mandatory
},
"default_locale": "en"
}
```

To initiate the webapp installation we can use the Apps API:

```
var r = window.navigator.mozApps.install("/manifest.webapp");
r.onsuccess = function() {
alert("App installed")
}
r.onerror = function() {
alert("App installed")
}
```

TOUCH EVENTS

Mouse events (such as click) are not always suitable for mobile devices for different reasons, including:

a) A delay of 300ms before firing the event handler.
b) They don't support multitouch.
c) The clickable area using a finger is not always just one pixel.

Apple Touch Events

Safari on iOS created the touch events, a series of 4 events that we can detect on any DOM element. Most of the other mobile browsers (excluding IE) support this specification.

The events available are:

- **touchstart**
- **touchend**
- **touchmove**
- **touchcancel**

All the events can be attached using addEventListener or through HTML DOM properties, such as ontouchstart. Every event receives through the first argument a touches collection. This collection includes each of the current available touches as a Touch object where we can get coordinates (such as pageX):

```
document.addEventListener("touchstart", function(event) {
          var touches = event.touches;
          var quantity = touches.length;
          var firstTouch = touches[0];
          var coordinates = {
                              x: firstTouch.pageX,
                              y: firstTouch.pageY
                            }
}, false);
```

Gesture API
Compatible only with Safari on iOS, we can use gesture events to detect two-fingers rotate and pinch gestures:

```
document.addEventListener("gesturechange", function(event) {
          var currentRotation = event.rotation;
          var currentScale = event.scale;
}, false);
```

W3C Touch Events

W3C has standardized Apple Touch Events with the additions of touchenter and touchleave for dragging purposes. Firefox and BlackBerry smartphones and tablets are using this spec.

The Gesture API is not included.

Microsoft Pointer Events

Microsoft is using another approach through Pointer events (also to be standardized in the W3C). Pointer events inherit from mouse events; therefore instead of receiving a collection of touches we receive one call per touch only with the information of the current point.

Pointer events include support for touch, mouse, and styles; the most useful available events are pointerdown, pointerup, pointercancel, pointermove, pointerover, pointerout. In IE10, these events are prefixed with MS; for example: mspointerup.

```
document.addEventListener("mspointerdown", function(event) {
          var coordinates = {
                              x: event.clientX,
                              y: event.clientY
                            }
}, false);
```

Gesture API
Microsoft also supports a Gesture API for more complex touch interaction detection, including:

- **msgesturehold**
- **msgesturetap**
- **msgesturestart**
- **msgestureend**
- **msgesturechange**
- **msinertiastart**

OFFLINE SUPPORT

Most mobile browsers support offline access through the Application Cache API. This API allows us to define a package that the browser will install for future access.

Step 1: Define the manifest file

```
<!DOCTYPE html>
<html manifest="offline.manifest">
```

Step 2: Define the offline.manifest

```
CACHE MANIFEST

# This is a comment line

# We define first the files that need to be downloaded
# The HTML file is always included in the package

CACHE:
styles/mystyles.css
scripts/mycode.js
images/myimages.png

# If we want the app to access some resources on the web
# We can define specific URLs or a pattern, such as *
NETWORK
*
```

Step 3: Detect events client-side

Through the object window.applicationCache we can detect several events over the process, such as downloading, cached, noupdate, and updateready.

```
window.applicationCache.addEventListener("cached",
function() {
                    alert("The package was installed");
}
, false);
```

How Application Cache works

If the webapp was installed (cached event) then the next time the user accesses it, it will always be loaded from the cached version, even if the user has a connection.

If there is a connection available, the browser will download the manifest file and it will compare byte-by-byte with the stored version. If it is the same, the noupdate event will be fired; if the manifest has changed, then the whole package will be discarded from the cache and downloaded again from the server firing the updateready event.

It's important to understand that when an update is available, the user is still seeing the old version as it was loaded from the cache, so the next reload or access will use the updated resources.

CLIENT-SIDE STORAGE

Whether we are online or offline we can store information on the user's device using some of the client-side storage APIs, including localStorage, Web SQL Storage, IndexedDB and FileSystem API.

Limits vary per platform, but usually localStorage gives us safely at least 5Mb per origin (protocol+domain+port combination). On some platforms such as iOS, we can overpass the 5Mb limit with the user's permission usually up to 50Mb.

HYBRID/NATIVE WEBAPP

With HTML5 we can create native webapps, also known as hybrid apps, and distribute them through Application Stores.

These platforms require packaging all the resources, and sometimes compiling and signing processes.

The most important platforms to create native webapps are:

Distribution

Name	Platforms	Compatible Stores
WebWorks	BlackBerry 5.x-7.x BlackBerry PlayBook BlackBerry 10	BlackBerry AppWorld
Windows 8 Store HTML5 apps	Windows 8	Microsoft Windows Store
Nokia S40 webapps	Nokia Series 40	Nokia Store

Name	Platforms	Compatible Stores
Symbian webapps	Symbian	Nokia Store
Mozilla Open Web Apps	Firefox OS Android Desktop	Mozilla Marketplace
Chrome Packaged Apps	Desktop Chrome OS Android (future)	Chrome Store
Apache Cordova / Adobe PhoneGap	iOS Android BlackBerry Windows Phone Bada / Tizen Symbian	Apple AppStore Google Play Store BlackBerry AppWorld Microsoft Windows Phone Store Nokia Store

The native HTML5 webapp should be distributed through an application store for free or for a fee. To do that, we need to register as publishers in the stores and pay the publisher fee as defined in the next table:

store	publisher fee	url
Apple AppStore	USD 99 per year	developer.apple.com/ios/program
Google Play Store	USD 25	play.google.com/apps/publish
Amazon AppStore for Android	Free	developer.amazon.com/apps/apps
BlackBerry AppWorld	Free	appworld.blackberry.com/isvportal
Windows 8 Store	Varies	appdev.microsoft.com/StorePortals
Windows Phone Store	USD 99 per year	dev.windowsphone.com
Nokia Store	EUR 1	publish.nokia.com

MOBILE BROWSERS

These are the available mobile browsers by platform:

Platform	Default Browser	Other Browsers
iOS	Safari (WebKit)	Opera Mini, Google Chrome (Web View)
Android	Android Browser (WebKit)	Google Chrome (4.0+), Firefox, Opera Mini, Opera Mobile, Opera (WebKit), UC Browser, Dolphin
BlackBerry	BlackBerry Browser (WebKit)	Opera Mini (for old smartphones)
Windows Phone	Internet Explorer	Nokia Xpress (experimental)
Symbian	Nokia Browser (WebKit)	Opera Mobile, Opera Mini
Firefox OS	Firefox	
Kindle Fire (Android)	Amazon Silk	
Nokia S40	Nokia Xpress Browser	Opera Mini
Other	Jasmine, Dolfin,NetFront, UC Web, webOS Browser (now Iris)	

EMULATORS

These are the available emulators and simulators per platforms (source: http://emulato.rs):

Platform	Host Platforms	Where to get it for free
iOS	Mac	Search for Xcode on Mac App Store
Android	Windows, Linux, Mac	http://developer.android.com/sdk
Windows Phone	Windows 8 Pro	Visual Studio 2012 Express for Windows Phone
Windows 8 Tablet	Windows 8 Pro	Visual Studio 2012 Express for Windows 8
BlackBerry 10	Windows, Linux, Mac	http://developer.blackberry.com/devzone/ develop/simulator/
BlackBerry 6/7	Windows	http://us.blackberry.com/sites/developers/ resources/simulators.html
Firefox OS	Windows, Linux, Mac	https://addons.mozilla.org/en-US/firefox/addon/firefox-os-simulator/
Nokia S40	Windows	https://www.developer.nokia.com/Develop/Series_40/

REMOTE DEBUGGING

Support for remote debugging for HTML, CSS and JavaScript:

Browser	Host Browser	Connection Method
Safari for iOS	Safari for Mac	USB cable with the device
Google Chrome on Android	Google Chrome Windows, Mac or Linux	USB cable with the device and ADB tools (Android Debug Bridge)
Firefox on Android and Firefox OS	Firefox Windows, Mac or Linux	TCP via IP Address (same Wi-Fi network)
BlackBerry 7 and 10 Browser	Any Webkit-based desktop browser	TCP via IP Address (same Wi-Fi network)
Opera Mobile for Android or Symbian	Opera for Windows, Mac or Linux	TCP via IP Address (same Wi-Fi network)

HTML5 APIS

These APIs might not be available on all the browsers and platforms. Check http://caniuse.com or http://mobilehtml5.org for compatibility tables.

Geolocation

```
navigator.geolocation.getCurrentPosition(
    function(position) {
          var lat = position.coords.latitude;
          var lon = position.coords.longitude;
    },
    function () {
          alert('Error locating your device');
    }
);
```

Accelerometer, Magnetometer & Gyroscope

We can read current acceleration in 3 axes measured in m/s² including gravity or excluding it on some devices only:

```
window.addEventListener("devicemotion", function(event) {
          var acceleration = event.accelerationIncludingGravity;
          // acceleration.x, acceleration.y, acceleration.z

}, false);
```

We can also read current device orientation as alpha (direction according to the compass), beta (angle of the tilt front-to-back) and gamma (angle of the tilt left-to-right). All angles are measured in degrees.

```
window.addEventListener("devicemotion", function(event) {
          var acceleration = event.accelerationIncludingGravity;
          // acceleration.x, acceleration.y, acceleration.z

}, false);
```

Battery

```
var battery = navigator.mozBattery || navigator.webkitBattery;
var level = battery.level * 100;
var charging = battery.charging;
var chargingTimeFully = battery.chargingTime;
var dischargingTimeEmpty = battery.dischargingTime;

// Events available
battery.addEventListener("levelchange", handler, false);
battery.addEventListener("chargingchange", handler, false);
battery.addEventListener("chargingtimechange", handler, false);
battery.addEventListener("dischargingtimechange", handler,
false);
```

Vibration

```
// One time vibration for 0.5 seconds
navigator.vibrate(500);
// Vibration pattern (vibration/pause)
navigator.vibrate([500, 500, 1000, 600,100]);
```

Media capture

Using HTML forms to capture media:

```
<input type="file" accept="image/*" capture="camera">
<input type="file" accept="audio/*" capture="microphone">
<input type="file" accept="video/*" capture="camcorder">
```

Reading the camera as <video> input:

```
var video = document.querySelector("video");
var URL = window.URL || window.webkitURL;
var getUserMedia = navigator.getUserMedia ||
   navigator.webkitGetUserMedia || navigator.mozGetUserMedia;
var video = document.getElementById("player");
if (getUserMedia) {
          getUserMedia({audio:true, video:true},
              function(stream){
                 video.src=URL.createObjectURL(stream);
                 video.play();
              });
}
```

RESOURCES

HTML5 documentation: www.webplatform.org
Can I Use Compatibility Tables: www.caniuse.com
HTML5 Compatibility Tables: www.mobilehtml5.org
HTML5 Rocks for Mobile: www.html5rocks.com/mobile
HTML5 demos: www.html5demos.com
Emulators and Simulators: www.emulato.rs
HTML5 Test: www.html5test.com
HTML5 Developer Scorecard: http://www.sencha.com/blog/category/

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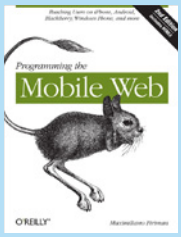
Max Firtman is a developer, consultant, and speaker, and international expert on mobile and web 2.0. Max has written two books with O'Reilly ("Programming the Mobile Web" and "jQuery Mobile: Up and Running"), is a certified Nokia and BlackBerry trainer, and regularly speaks at conferences around the world. He has founded several companies, taught at several universities, and maintains several major mobile HTML5 resource sites, including mobile HTML5 compatibility tables (http://mobilehtml5.org/) and media queries test sites (http://mediaqueriestest.com/).

RECOMMENDED BOOK



Author and mobile development expert Maximiliano Firtman shows you how to develop a standard app core that you can extend to work with specific devices. This updated edition covers many recent advances in mobile development, including responsive web design techniques, offline storage, mobile design patterns, and new mobile browsers, platforms, and hardware APIs.

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