MOBILE HELIX LINK™
SDK OVERVIEW

A MOBILE HELIX WHITEPAPER

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Mobile Helix Link – Your business is everywhere, your information needs to be.

Introduction

The enterprise is at the center of a revolution. The transition from corporate-owned and corporate-controlled computers to an environment with a vast range of employee-owned and corporate-owned devices has accelerated at an unprecedented pace. Mobile is leading this change, but the impacts are felt across both mobile and fixed access and use. Enterprises need a unified approach to data security, application development, delivery and support that works across any kind of device. For all the rapid advances made in mobility, there are significant barriers and blockers to the truly application-first and mobile-first enterprise. Existing solutions are neither tailored for the mobile enterprise nor for the wider enterprise application need – the current solution models are too complex, are proprietary, and operate in multiple technology silos.

Mobile is making dramatic changes to the way we communicate and work. People carry incredibly powerful mobile computing devices that offer the processing power, data storage and screen resolution of a recent laptop computer. This revolution creates an incredible opportunity for enterprises.

Businesses must embrace this new computing model. In the mobile-first enterprise, employees need to remain connected and be productive wherever they are, with seamless access to the same data and resources available to them in their office.

Mobile Helix Link enables organizations to mobilize apps and information with:

- The industry's most advanced data security platform, ensuring that corporate data is safe and secure in all circumstances.

- A simple architecture for integrating the Link system into the existing IT infrastructure built to support the corporate intranet, ensuring that Link is ready to scale to the needs of your enterprise on day one.

- The Link HTML5 SDK, which makes it easy for developers to build pure HTML5 apps that are transparently secured by the Link system while delivering a native-like user experience.

This whitepaper will describe the Link HTML5 SDK, its key components, and its key features and benefits. It will then illustrate how an enterprise Web application developer can use the SDK to deliver enhanced, enterprise-grade HTML5 apps and mobile-optimized HTML5 apps without the need for changes to the existing Web application delivery infrastructure or existing enterprise security model.

What Are Pure HTML5 Apps?

Mobile Helix Link is an end-to-end solution for developing and delivering mobile apps using standard technologies, including HTML5, CSS3, JavaScript, Apache Cordova, and HTTPS for the implementation and delivery of these apps. Pure HTML5 apps refer to apps that are built using open technologies and delivered via standard web servers, application servers, portal servers, and HTTPS infrastructure.

Unlike native apps or hybrid-native apps, pure HTML5 apps are delivered to the mobile client the same way as any familiar web application – they are downloaded into the browser when the app is first accessed. Leveraging HTML5's extended capabilities for supporting offline access, the app is then cached locally to improve the performance of future loads and to ensure that the app is available offline.

The advantage of the pure HTML5 solution is that enterprises avoid vendor lock-in with a fully standards compliant approach, and enterprises do not need to invest in app store infrastructures, which quickly become more complex than they seem. The complexities of app stores include the app store itself, managing user upgrades (i.e. coercing users to upgrade), the additional bandwidth required to deliver packaged apps, including upgrades, and the associated processes for managing and supporting multiple app versions. Pure HTML5 apps fit into the way IT builds any web app – the same processes, tools, timelines and technologies apply – and, hence, one significant barrier to mobilizing the enterprise is eliminated in the pure HTML5 approach.

Why Choose the Link HTML5 SDK?

When an organization decides to build new enterprise app for for mobile use or mobilize an existing enterprise application, the options for how to do so can be overwhelming. The mobile arena is particularly complex. The first fundamental decision confronting any new project is whether to develop the application in native code targeted to a single mobile OS or to choose one of the many cross-platform options. Within the latter category, there is a second fundamental choice to be made between proprietary platforms for cross-platform mobile development and open platforms based on HTML5. The best way to approach this decision is with a clear understanding of the benefits of each approach and how they map to your organization's requirements.

Mobile Helix's Link HTML5 SDK offers enterprise software developers a comprehensive HTML5 based set of development tools that can be used in collaboration with the Link System. The Link HTML5 SDK is the right choice if your requirements include:

- Support for multiple platforms for mobile and fixed use and access

- Tight integration with existing enterprise systems and data

- Rapid development, leveraging an existing team and existing code, tools, and skills

- Minimal impact on your enterprise applications infrastructure

- Iterative development, with a rapid pace of feature introduction and innovation

- Enterprise-grade security built-in via the Link Container and the Mobile Helix Data Security Platform

The Link HTML5 SDK enables developers to write new custom applications for fixed and mobile use, starting with existing code, using familiar Web based tools and techniques. Applications enhanced or written using the Link HTML5 SDK are designed to integrate seamlessly with an enterprise's existing Web application delivery infrastructure, and to support the same integrated development environment that the development team already uses and with which it is most comfortable.

The Link HTML5 SDK is not right for every project. This is particularly true when cross-platform development is not a requirement. The Link Native SDK may be an attractive alternative approach in such cases. More information on the Link Native SDK is available by contacting Mobile Helix.

Mobile HTML5 with the Link HTML5 SDK

The Link HTML5 SDK is designed to allow enterprise Web developers to rapidly build, deploy, and enhance fixed and mobile applications that are inherently cross-platform, secure by design, and do not compromise on the mobile user experience. The SDK is built on top of standard technologies, including:

- HTML and HTML5 extensions, including enhanced support for offline access and local storage

- CSS3, including a packaged library of styles for many common UI components

- jQuery, jQuery Mobile, and Mobile Helix's own component library built as plugins to jQuery Mobile for client-side UI manipulation and event handling

- A comprehensive package of Web services supporting access to enterprise systems including SharePoint®, e-mail, and files (via CIFS and FTP)

- Transparent integration with SSO systems, including SAML and Windows Integrated Authentication (NTLMv2 or Kerberos)

- In addition, Mobile Helix provides a plugin today for Java Server Faces (built on top of PrimeFaces and PrimeFaces Mobile) with an integration with .NET in the roadmap

Unlike other approaches to mobile application development, applications created or enhanced using the Link HTML5 SDK can be delivered via existing Web application delivery infrastructure without changes, including (when relevant) existing load balancers, web servers, application servers, and portal servers. Mobile Helix's HTTPS acceleration technology in the Mobile Helix Gateway and online/offline caching in the Link Container enable applications to be delivered "on the fly" when a user first accesses that application. Thereafter the application is available on the device for both online and offline use.

Applications built using the Link HTML5 SDK have the option to execute within the Link infrastructure, which addresses several barriers to mobile development in HTML5 including:

- **Secure network access without VPN** – The Link Gateway sits between the Link Container on the mobile device and the enterprise network. It is a transparent reverse proxy, so that applications need no knowledge of it. The Gateway creates a tightly controlled access point into the enterprise network. Only devices and users that authenticate correctly with the Link Gateway are granted access to the enterprise network.

- **The Mobile Helix Data Security Platform** – Link takes the responsibility for protecting data on the public network and on the device out of the hands of developers and puts it into the Link infrastructure. Link encrypts all data in transit on the public network and all data at rest. Encryption of data in transit via SSL/TLS occurs regardless of whether applications are built and deployed using http or https. All data cached or stored on the device via HTML5's offline APIs is encrypted by default using AES-256 encryption.

- **Traffic compression and caching** – Link implements several advanced techniques to optimize communication between the enterprise network and the mobile device. First, Link performs standard compression of all HTTPS traffic in both directions to minimize the transmitted data. Second, Link implements a symmetric cache on both sides of the communication link to ensure that only untransmitted data gets sent to the mobile device. The cache is transparent to applications that are mobilized using Link.

Core Features of the Link Infrastructure

The Link infrastructure transparently supports applications in a number of ways that are detailed in this section. Each of these features is automatically built into each application without any additional work by the application developer. The Link Application Server, which hosts Mobile Helix's out-of-the-box applications for email, file access and

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SharePoint® access, is provided as source code to illustrate Link's infrastructure features in action.

Authentication

Users are authenticated at the container level and access to the enterprise network is restricted to authenticated users via the Link Gateway. Application authorization can also be configured via the Link Controller to restrict which groups of users have access to a particular mobile application built in the Link HTML5 SDK. To transmit session information to an application (including a secure session ID, user policies, device type, device location upon session initiation, etc.) an application running on a web server or application server can register for a Web service notification from the Link Controller. Applications can thereafter use the secure session ID (SSID) forwarded from the Link Gateway to match connections to sessions without requiring any application-specific authentication.

Alternatively, the Link Controller and Link Gateway integrate with SAML and windows authentication (Kerberos and NTLMv2) so that if either mechanism is used by an application to authenticate users, Link will ensure a single sign-on experience. Note that applications built using Link only need to worry about online authentication and, thus, the authentication mechanism can be built into the application server or the web server hosting the application. Offline authentication is managed by the Link Container and by the policies specified in the Link Controller.

Managing Online and Offline Access

The Link Container transparently manages online and offline access to applications deployed via the Link infrastructure. The offline access infrastructure is comprised of a few key components:

- State management – the Link Container detects whether a user is online or offline and ensures that information is available to the application via a standard JavaScript API. In addition, the Container automatically transitions between serving content from local cache vs. from the enterprise network via the Link Gateway based on connection status.

- Offline authentication – the Link Container manages a user's offline authentication according to a policy specified in the Link Controller. This policy allows for offline authentication via a user's standard user ID and password, via user ID and a unique offline PIN code, or via a combination of password and PIN code. Whenever a user accesses an application offline that user has first been authenticated, freeing applications from the need for a custom offline authentication scheme.

Core features of the Link infrastructure:

- Authentication

- Managing online/offline access

- Managing files

- Push notifications

- The Link system transparently caches all visited pages and resources (resources include images/stylesheets/scripts/data accessed by an HTML page) so that users can browse cached content offline. The offline cache is encrypted, with automatic data expiration after a certain period of time if specified via policy. HTML5 manifest files are used to ensure that an application's essential code and resources are never removed from the on-device cache. Applications that should be available online only can be configured as such to prevent offline caching.

- The Link system enhances the standard HTML5 offline key-value store and the WebSQL database API to encrypt data by default. This provides developers with a standardized, portable, and familiar API for offline storage without having to worry about data protection. In addition, the Link HTML5 SDK provides an intuitive data synchronization API built on top of the HTML5 offline standards, which enables developers to build offline apps with ease.

Managing Files

The Link Container provides a suite of enhanced features for file management, including offline file storage, secure editing with Documents To Go® and other 3rd party document editors, policy permitting, and the ability to save edited files or files created on the device in a SharePoint document library or a Windows File share. These features are described further in the JavaScript environment discussion below.

Push Notifications

The Link system enables and manages push notifications to the mobile device by (a) collecting the platform-specific information required to initiate a device push and registering the device container to receive pushes (e.g., from the Apple Push Notification Service or the Google Cloud Messaging for Android), (b) providing a Web services API on the Link Controller to trigger custom push service notifications to a device or devices, and (c) notifying any running apps running in the Link Container when a push notification occurs by triggering a custom HTML DOM event that an application can listen for using standard JavaScript

The Link HTML5 SDK JavaScript Environment

The Link HTML5 SDK's JavaScript-based client-side development environment is designed to:

- Leverage standard APIs and mechanisms as much as possible while enhancing those APIs to transparently encrypt and protect data.

- Enhance JavaScript's standard access to device capabilities by leveraging the open Apache Cordova (formerly PhoneGap) platform, including an additional set of open source plugins developed by Mobile Helix.

- Integrate the JavaScript development environment with the Link infrastructure to provide enhanced support for file storage and file management (described below) and for push notifications.

Link integrates Apache Cordova into the Link Container (Apache Cordova was previously known as PhoneGap). Cordova is a set of JavaScript calls that are converted into calls in the native device SDK for device specific functionality. A common example is access to the iOS photo roll and the camera. In addition to the standard functionality provided by Apache Cordova, Link includes several additional open source plugins developed or adapted by Mobile Helix for secure document editing and offline document storage.

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>
> - Leverage standard APIs
>
> - Enhance standard access devices
>
> - Integrate with the JavaScript development environment

Mobile UIs in the Link HTML5 SDK

Building an intuitive and mobile friendly UI is critical to the success of any mobile development effort. To that end, the third component of the Link HTML5 SDK is a set of UI components targeted to mobile devices. These components make it easy to build simple, compelling, easy to use mobile UIs that work well across phones, tablets, and phablets. Rather than having to figure out exactly how to get the browser on each mobile platform to, for example, lay out two independent, scrolling components next to each other, the Link HTML5 SDK allows developers to easily define scrolling components with CSS. The SDK's JSF integration (and upcoming .NET integration) make it easy to generate stylized HTML in a Java EE or .NET environment, but the Link HTML5 SDK integrates with any server-side development language and infrastructure.

Following the jQuery Mobile model, developers write standard HTML5 that the Link HTML5 SDK detects and, when a page loads, "enhances" into a rich UI component. All of the components available in jQuery and jQuery Mobile are incorporated into the Link HTML5 SDK. In addition, Link offers unique components such as:

- **Split screen view** – much like the native e-mail applications for iOS and Android, this component makes it easy to display a list of data in the left column of a view with detail on the selected component in the right portion of the split screen. This component is used in the Link Content Share and Link Email solutions.

- **Native scrolling** – creating multiple independent components of a page that implement smooth swipe scrolling is challenging using standard HTML and CSS. The Link HTML5 SDK makes it easy to mark any component on a page as a

scroller, and it transparently manages the scroller as the underlying DOM is enhanced and modified.

- **Data tables and data grids** – the Link HTML5 SDK includes packaged components for offline-synchronized data tables, with support for tap events, tap-hold context menus, and custom styling.

- **Rich text/HTML editing** – the Link HTML5 SDK includes an editor that allows developers to include formatted editing (with styling like bold/italics/etc.) in any application. The editor includes mobile friendly buttons and styles so that it renders well on devices with limited screen space.

Link HTML5 SDK – Key Enterprise Benefits

The Link HTML5 SDK has been designed to deliver significant benefits to the enterprise and to enterprise application developers. The benefits include the following:

- Creates an underlying app platform that supports app development across the fixed/mobile divide. Extensions to HTML5 in the mobile area, combined with unparalleled end-to-end security ensure that it is enterprise-ready.

- Extends the enterprise security model to the mobile device. It takes existing roles/users/passwords/sign-on mechanisms/SSO implementations and leverages all of it in a mobile context without having to do any work, write any code, or reconfigure the enterprise network.

- Closes gaps in the HTML5 standard to provide access to essential mobile device features. We have integrated with Apache Cordova (previously known as PhoneGap) to provide access to a comprehensive set of device features.

- Makes it possible to develop rich mobile UIs using familiar tools and techniques. Developers can work with existing IDEs and development tools, can easily debug applications using desktop browsers and browser plugins for debugging, and can deploy applications with existing infrastructure available for testing Web applications.

- Is built on a standard and open software stack including jQuery, jQuery Mobile, PrimeFaces and PrimeFaces Mobile (for the JSF integration), and a number of open source enhancements, plugins and extensions either integrated or built by Mobile Helix. The SDK can easily be expanded with additional, customized plugins to jQuery or jQuery Mobile.

- All JavaScript code is provided as un-obfuscated source code as are all Apache Cordova plugins. These code components are available for use with or without the Link infrastructure.

With the Link HTML5 SDK, enterprises can seamlessly extend their appilcations infrastructure to mobile endpoints, delivering a mobile-optimized user experience and with assurance that enterprise resources and data are safe. In addition, choosing the Link HTML5 SDK ensures that mobile apps are built using standardized and open technologies, allowing enterprise development teams to benefit from the growing community support for HTML5. Finally, choosing an open solution avoids the many risks of vendor lock-in, and it avoids the education and training challenges in embracing a proprietary technology stack for mobile development.

Comparison with Other Systems

There are a number of important and unique features of the Link system and the Link HTML5 SDK that differentiate it relative to other solutions for enterprise mobility. These unique features include the following items.

- Mobile Helix does not force developers to use a particular programming model and we do not rely on proprietary libraries or languages. Our goal is to enable developers to use the programming model with which they are most familiar.

- The learning curve for the Link HTML5 SDK is minimal – our technology stack is well understood by enterprise Web developers. Our goal is to enable enterprise web development teams to go mobile without the learning curve of alternative approaches.

- Mobile applications can re-use the infrastructure supporting the enterprise Web:

    o SSO systems, including SAML 2.0, NTLMv2 and Kerberos

    o Standard Application servers and the business logic and data access code already built for those systems

    o Standard Web services to access disparate enterprise systems

    o Standard load balancers to ensure the availability and scalability of the mobile infrastructure

With the Link HTML5 SDK, mobile app development can start now – without new hires, extensive training courses, or costly services.

Summary

In summary, the Link HTML5 SDK allows enterprises to:

- Bridge the fixed/mobile application divide by allowing any existing or new browser-based enterprise application to be deployed across multiple device types, including mobile devices, PCs and laptops

- Make the existing enterprise Web mobile; there is no need to start from scratch; tangible results and benefits are available to Link users immediately

- Re-use the technologies, tools and systems that enterprises already know for application development and delivery

- Build on top of an infrastructure that is open and familiar and is flexible and easy to modify

- Transparently address the most difficult aspects of mobility, particularly concerning security, performance, and offline access without the need to become mobile application development experts

- Build high quality mobile user interfaces and experiences that are tightly integrated with the unique capabilities of the mobile device and with existing enterprise systems

Conclusion

Mobile Helix Link and the Link HTML5 SDK are designed to enable a seamless path to enterprise mobility. Link enables IT to securely and easily extend mobile access to the corporate Intranet, with none of the infrastructure overhead, complexity and security risk of alternate approaches.

Link's pure HTML5 apps are delivered via existing intranet infrastructure, ensuring that your mobile infrastructure is ready to scale on day one. The JavaScript execution environment in the Link Container and the features of the Link HTML5 SDK make building pure HTML5 mobile apps safe, secure, and easy. With the Link HTML5 SDK, pure HTML5 apps can support push notifications, can access native device features not available in the HTML5 standard, and can securely store data offline with rich policy controls. The Link HTML5 SDK's UI component library gives web developers the tools they need to build native-like user experiences using HTML5.

At Mobile Helix, our goal is to build partnerships with our customers that enable the mobile enterprise, and Link provides the underlying technology required to implement

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that partnership. For more information about the Link solution or to conduct a pilot of the solution, please contact us or visit us at www.mobilehelix.com

About Mobile Helix Link™

Mobile Helix is an enterprise application and data security platform provider focused on enabling unrestricted enterprise productivity. We are redefining endpoint computing by evolving and extending existing IT infrastructure and standards rather than reinventing them. At our core are three fundamental principles that are at the center of everything that we do: 1) we are application- and data-centric – we embrace the blurring lines between phones, tablets and laptops, permitting IT to relinquish control of the endpoint device entirely and embrace a bring-your-own-anything policy; 2) we provide unmatched yet unobtrusive security for sensitive corporate data by intelligently securing the data rather than the devices; and 3) simplicity is embedded into the DNA of our products, our designs and our communications. Our solution, Mobile Helix Link, is the industry's first pure HTML5 platform that combines unparalleled data security, a unique HTML5 application development and delivery platform, and breakthrough patent-pending performance enhancement technology. To learn more about Mobile Helix Link please visit us at www.mobilehelix.com.

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