

NATIONAL ENTERPRISE ARCHITECTURE FRAMEWORK KINGDOM OF BAHRAIN

Technology Standards and Guidelines

Mobile Domain



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DOCUMENT INFORMATION AND HISTORY

Document Reference Number: ETS-MOB-01.01		Title: Mobile Domain	
Document Type: Enterprise Technology Standards		Category: Mobile	
Approver: ICT Governance Committee (ICTGC)		Approval Date: 04/12/2013	
Effective Date: 04/12/2013	Last Review Date: 02/12/2013	Next Review Date: As Required	
SPOC for Change: NEAF Chief Architect – Email ID: neaf@ega.gov.bh			
Synopsis: Establishes technology standards and guidelines in Mobile Domain for Information Systems			

Document History

Version Number	Date (dd/mm/yyyy)	Author	Remarks
1.0	02/12/2013	NEAF Team	Baseline version and incorporated review comments from ICTGC

Review and Approval History

Version Number	Date (dd/mm/yyyy)	Reviewer / Approver	Remarks
1.0	04/12/2013	ICTGC	Formal approval by ICTGC

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1. INTRODUCTION

This document covers tools, technologies and standards used in the Mobile domain. The process of arriving at these standards has been outlined in the NEAF - Technology Standards Methodology & Process document in Section 3 - Methodology and Approach. Some of the tools, technologies and standards have been identified as potential requirements and hence been incorporated in this document. These may be considered as recommendations for current and future use.

This document shall be considered for revision in conjunction with the NEAF - Technology Standards Methodology & Process document at appropriate intervals of time as decided by the ICT Governance Committee. Any addition or upgrade to these tools and standards may be incorporated by following the process described in the NEAF - Technology Standards Methodology & Process document in Section 6 - Review and Maintenance of Technology Standards and Guidelines.

2. SUMMARY OF TECHNOLOGY STANDARDS/SPECIFICATIONS AND TOOLS

This section contains a summary of standards and tools applicable to the Mobile domain. These have been grouped into sub-sections (categories), with each category addressing one aspect of the related standards and tools. Further details and links to these standards and tools have been provided in the following sections of this document.

The rationale for selection of these standards and tools are :

- Based on the usage across ministries as captured in the internal survey.
- Technology best practices.
- References from international standards bodies.

2.1. APPLICATION DEVELOPMENT TECHNOLOGIES FOR MOBILE DEVICES

Introduction to Sub-Category	<ul style="list-style-type: none"> ▪ Application Development and Support Platforms provide the agencies with distinct approaches to address different application needs/requirements. There are specialized application development platforms for handheld devices. Ministries/agencies developing or purchasing new, wireless departmental or enterprise applications that will be accessed primarily via wireless phones and PDAs must utilize these customized application development platforms.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ Microsoft .NET Compact Framework – (Details) ▪ Java Platform, Micro Edition – (Details) ▪ XCode – (Details) ▪ Objective-C – (Details)
Remarks	The mobile applications should also support HTML5 (once it has been accepted as a standard) which has been covered in the Application domain document section 3.13.
Exceptions	

2.2. COMMUNICATION TECHNOLOGIES FOR MOBILE DEVICES

Introduction to Sub-Category	<ul style="list-style-type: none"> ▪ Mobile device communication has matured over the last few years. Communication between mobile devices and other networks mainly consists of using the Wireless Application Protocol and the standards for near field communication which enable contactless communication between devices. Ministries/agencies developing or purchasing new, wireless departmental or enterprise applications that will be accessed primarily via wireless phones and PDAs must ensure these protocols are supported.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ XHTML Mobile Profile – (Details)

	<ul style="list-style-type: none"> ▪ Near Filed Communication Interface and Protocol – (Details) ▪ Short Message Service – (Details)
Remarks	
Exceptions	

2.3. DEVELOPMENT TOOLS FOR MOBILE DEVICES

Introduction to Sub-Category	<ul style="list-style-type: none"> ▪ Mobile device development is defined both by the device and the technologies associated with the device. In order to assist developers to easily map these two sets of information, a tool developed by ScientiaMobile, Inc. Is used. This is the Wireless Universal Resource File (WURFL).
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ Wireless Universal Resource File – (Details)
Remarks	
Exceptions	

2.4. MOBILE PLATFORM SDKs

Introduction to Sub - Category	<ul style="list-style-type: none"> ▪ An operating system (commonly abbreviated to either OS or O/S) is an interface between hardware and user. An OS is responsible for the management and coordination of activities and the sharing of the resources of the computer. A Mobile operating system, also known as a Mobile OS, a Mobile platform, or a handheld operating system, is the operating system that controls a mobile device—similar in principle to an operating system such as Linux or Windows that controls a desktop computer. However, they are currently somewhat simpler, and deal more with the wireless versions of broadband and local connectivity, mobile multimedia formats, and different input methods.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ Android SDK – (Details) ▪ Symbian OS SDK – (Details) ▪ iOS SDK – (Details) ▪ Windows Phone OS SDK – (Details) ▪ BlackBerry OS SDK – (Details)
Remarks	OS and application versions over 3 years old will not be supported
Exceptions	

3. DETAILS OF STANDARDS / SPECIFICATIONS AND ASSOCIATED GUIDELINES

This section provides a brief description of the relevant standards listed in section 2 along with links for references to these standards.

3.1. XCODE	
Description	<ul style="list-style-type: none">▪ Xcode is Apple's powerful integrated development environment for creating apps for Mac, iPhone, and iPad. Xcode includes the Instruments analysis tool, iOS Simulator, and the latest SDKs for iOS and OS X.▪ The Xcode interface seamlessly integrates code editing, UI design with Interface Builder, testing, and debugging, all within a single window. The embedded Apple LLVM compiler underlines coding mistakes as you type, and is even smart enough to fix the problems for you automatically.
Applicable to	<ul style="list-style-type: none">▪ Application Development Technologies for Mobile Devices
Reference(s)	<ul style="list-style-type: none">▪ https://developer.apple.com/xcode/
Remarks	<ul style="list-style-type: none">▪ XCode development environment is also included in the section on iOS SDK.

3.2. OBJECTIVE-C	
Description	<ul style="list-style-type: none">▪ Objective-C is the primary programming language you use when writing software for OS X and iOS. It's a superset of the C programming language and provides object-oriented capabilities and a dynamic runtime. Objective-C inherits the syntax, primitive types, and flow control statements of C and adds syntax for defining classes and methods. It also adds language-level support for object graph management and object literals while providing dynamic typing and binding, deferring many responsibilities until runtime.
Applicable to	<ul style="list-style-type: none">▪ Application Development Technologies for Mobile Devices
Reference(s)	<ul style="list-style-type: none">▪ https://developer.apple.com/library/mac/documentation/Cocoa/Conceptual/ProgrammingWithObjectiveC/Introduction/Introduction.html
Remarks	<ul style="list-style-type: none">▪ Objective-C is inherent in iOS SDK.

3.3. ANDROID OS SDK

Description	<ul style="list-style-type: none">Android is a mobile operating system running on the Linux kernel. It was initially developed by Google and later the Open Handset Alliance. It allows developers to write managed code in the Java language, controlling the device via Google-developed Java libraries.Google releases the Android code as open-source, under the Apache License. The Android Open Source Project (AOSP) is tasked with the maintenance and further development of Android.The Android SDK provides you the API libraries and developer tools necessary to build, test, and debug apps for Android.
Applicable to	<ul style="list-style-type: none">Mobile Platform SDK
Reference(s)	<ul style="list-style-type: none">Android Operating System http://www.android.comhttp://developer.android.com/sdk/index.htmlhttp://developer.android.com/training/index.htmlhttp://developer.android.com/reference/android/os/package-summary.html
Remarks	

3.4. SYMBIAN OS SDK

Description	<ul style="list-style-type: none">Symbian OS was designed for mobile devices, with associated libraries, user interface, frameworks and reference implementations of common tools, developed by Symbian Ltd. It was a descendant of Psion's EPOC and runs exclusively on ARM processors, although a non-productized x86 port existed.The SDKs include all the key resources needed for applications development, such as documentation, API reference, examples, and an emulator. An IDE is not included.
Applicable to	<ul style="list-style-type: none">Mobile Platform SDK
Reference(s)	<ul style="list-style-type: none">Symbian Operating System http://www.symbian.orghttp://www.developer.nokia.com/Develop/http://www.developer.nokia.com/Devices/Symbian/
Remarks	

3.5. BLACKBERRY OS SDK

Description	<ul style="list-style-type: none">BlackBerry OS is the proprietary software platform made by Research In Motion for its
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	<p>BlackBerry line of handhelds. BlackBerry OS provides multi-tasking, and makes heavy use of the device's specialized input devices, particularly the trackball or touch screen.</p> <ul style="list-style-type: none"> ▪ The BlackBerry platform is perhaps best known for its native support for corporate email, through MIDP 1.0 and, more recently, a subset of MIDP 2.0, which allows complete wireless activation and synchronization with Microsoft Exchange, Lotus Domino, or Novell GroupWise email, calendar, tasks, notes, and contacts, when used with BlackBerry Enterprise Server ▪ Blackberry provides multiple SDK options such as the Native SDK in C/C++, HTML5 based WebWorks and an Android based porting engine.
Applicable to	<ul style="list-style-type: none"> ▪ Mobile Platform SDK
Reference(s)	<ul style="list-style-type: none"> ▪ Blackberry Operating System - http://www.blackberry.com ▪ Blackberry OS - http://us.blackberry.com/apps-software/blackberry7/ ▪ https://developer.blackberry.com/ ▪ https://developer.blackberry.com/devzone/resources#simulator
Remarks	

3.6. MICROSOFT WINDOWS PHONE OS SDK

Description	<ul style="list-style-type: none"> ▪ Windows Mobile is a compact operating system combined with a suite of basic applications for mobile devices based on the Microsoft Win32 API. Devices that run Windows Mobile include Pocket PCs, Smart phones, Portable Media Centers, and on-board computers for certain automobiles. ▪ Windows Phone is a mobile operating system developed by Microsoft, and is the successor to its Windows Mobile platform, although incompatible with it. Unlike its predecessor, it is primarily aimed at the consumer market rather than the enterprise market. ▪ Windows Phone SDK consists of Visual Studio IDE that includes a toolbox containing phone controls, a phone-based designer skin, and project templates specific for phone application development. It also includes Windows Phone Emulator, which you can use to deploy, debug, and test your applications.
Applicable to	<ul style="list-style-type: none"> ▪ Mobile Platform SDK
Reference(s)	<ul style="list-style-type: none"> ▪ Windows Mobile http://www.microsoft.com/windowsmobile ▪ Windows Phone - http://www.microsoft.com/windowsphone/en-us/default.aspx ▪ http://msdn.microsoft.com/en-us/library/ff402535%28v=vs.92%29.aspx
Remarks	

3.7. iOS SDK

Description	<ul style="list-style-type: none">▪ iOS (originally iPhone OS) is a mobile operating system developed and distributed by Apple Inc. Originally released in 2007 for the iPhone and iPod Touch, it has since been extended to support other Apple devices such as the iPad and Apple TV. Unlike Windows CE (Mobile and Phone) and Android, Apple does not license iOS for installation on non-Apple hardware.▪ iOS is derived from OS X, with which it shares the Darwin foundation, and is therefore a Unix operating system. In iOS, there are four abstraction layers: the Core OS layer, the Core Services layer, the Media layer, and the Cocoa Touch layer.▪ Xcode is the complete developer toolset for creating Mac, iPhone, and iPad apps includes the Xcode IDE, performance analysis tools, iOS Simulator, and the latest Mac OS X and iOS SDKs.
Applicable to	<ul style="list-style-type: none">▪ Mobile Platform SDK
Reference(s)	<ul style="list-style-type: none">▪ Apple iOS –<ul style="list-style-type: none">○ http://www.apple.com/ios/○ https://developer.apple.com/technologies/ios/○ https://developer.apple.com/programs/ios/○ https://developer.apple.com/xcode/index.php○ https://developer.apple.com/devcenter/ios/index.action○
Remarks	

3.8. JAVA PLATFORM, MICRO EDITION

Description	<ul style="list-style-type: none">▪ Java Platform, Micro Edition, or Java ME, is a Java platform designed for mobile devices and embedded systems. Target devices range from industrial controls to mobile phones and set-top boxes.
Applicable to	<ul style="list-style-type: none">▪ Application Development Frameworks for Handheld Devices
Reference(s)	<ul style="list-style-type: none">▪ Java Platform, Mobile Edition http://www.oracle.com/technetwork/java/javame/index.html
Remarks	

3.9. MICROSOFT .NET COMPACT FRAMEWORK

Description	<ul style="list-style-type: none">▪ The Microsoft .NET Compact Framework (.NET CF) is a version of the .NET Framework that is designed to run on Windows CE based mobile/embedded devices such as PDAs, mobile
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	phones, factory controllers, set-top boxes, etc. The .NET Compact Framework uses some of the same class libraries as the full .NET Framework and also a few libraries designed specifically for mobile devices such as Windows CE InputPanel.
Applicable to	<ul style="list-style-type: none"> ▪ Application Development Frameworks for Handheld Devices
Reference(s)	<ul style="list-style-type: none"> ▪ Microsoft .NET Framework http://msdn.microsoft.com/en-us/netframework/aa497273.aspx
Remarks	

3.10. XHTML MOBILE PROFILE

Description	<ul style="list-style-type: none"> ▪ XHTML Mobile Profile (XHTML MP) is the standard language for mobile web development. ▪ XHTML MP is an XHTML variant. It offers richer presentation and is very similar to HTML. XHTML MP is built on top of XHTML Basic. ▪ This is the language used for WAP2.0
Applicable to	<ul style="list-style-type: none"> ▪ Communication Technologies For Mobile Devices
Reference(s)	<ul style="list-style-type: none"> ▪ XHTML Mobile Profile - http://www.openmobilealliance.org/tech/affiliates/wap/wap-277-xhtmlmp-20011029-a.pdf
Remarks	

3.11. NEAR FIELD COMMUNICATION INTERFACE AND PROTOCOL

Description	<ul style="list-style-type: none"> ▪ The potential for NFC applications and products is broad and deep, whether you're leveraging the promise of peer-to-peer Bluetooth communications, developing payment system applications, or creating the chips that will enable upcoming NFC-based products. ▪ NFC was developed to address the contactless standards dilemma. NFC is a technology standard that harmonizes and extends existing contactless standards. ▪ NFC technology is supported by the world's leading consumer electronics (CE) and mobile device manufacturers, semiconductor producers, network operators, developers, service companies, and financial institutions. ▪ NFC enables these organizations to invest in one technology that supports leading global contactless technologies and applications. By integrating NFC, devices can support and interoperate with existing contactless card applications and infrastructures such as access control, payment, and transport. ▪ It also introduces innovative new features that are only possible with the union of contactless technology and CE devices.
Applicable to	<ul style="list-style-type: none"> ▪ Communication Technologies For Mobile Devices
Reference(s)	

	<ul style="list-style-type: none"> ▪ http://www.nfc-forum.org/news/pr/view?item_key=4b07b8986013c08c68a8ef4fa128b6791c2df8df ▪ http://www.nfc-forum.org/specs/spec_list/ ▪ Near Field Communication Interface and Protocol-1 (NFCIP-1) <ul style="list-style-type: none"> ○ http://www.ecma-international.org/publications/standards/Ecma-340.htm ○ http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=38578 ▪ Near Field Communication Interface and Protocol-2 (NFCIP-2) <ul style="list-style-type: none"> ○ http://www.ecma-international.org/publications/standards/Ecma-352.htm ○ http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=56855 ▪ http://www.iso.org/iso/catalogue_detail.htm?csnumber=58023
Remarks	

3.12. SHORT MESSAGE SERVICE (SMS)	
Description	<ul style="list-style-type: none"> ▪ SMS enables a user to send and receive Short Messages (SMs) to and from another user. ▪ This service is based on GSM 03.40. The Service Centre functionality described in ISO/IEC 21989:2002 is equal to the functionality of a Service Centre in GSM 03.40. Thus, for interoperability with a GSM network, it is only necessary to implement a QSIG interface. ▪ Supplementary service specifications produced in three stages, according to the method described in ETS 300 387. ISO/IEC 21989:2002 contains the stage 1 and stage 2 specifications of SMS. The stage 1 specification specifies the service as seen by users of PISNs. The stage 2 specification identifies the functional entities involved in the service and the information flows between them.
Applicable to	<ul style="list-style-type: none"> ▪ Communication Technologies For Mobile Devices
Reference(s)	<ul style="list-style-type: none"> ▪ http://webstore.ansi.org/RecordDetail.aspx?sku=ISO/IEC+21989:2002 ▪ http://www.tiaonline.org/standards/technology/cdma2000/documents/TIA-EIA-637-A.pdf
Remarks	

4. DETAILS OF TOOLS SUPPORTING RECOMMENDED STANDARDS

This section provides a brief description of the relevant tools listed in section 2 along with links for references to these tools.

4.1. WURFL	
Description	<ul style="list-style-type: none">▪ WURFL is a Device Description Repository (DDR), i.e. a framework that enables applications to map HTTP requests to a description of the capability of the mobile device that requests the page. In this regard, WURFL pre-dates the time when the DDR term was coined and could arguably be characterized as the first DDR. In the last year, WURFL role has expanded from being a DDR for mobile devices to being a framework to detect every HTTP client worth recognizing.▪ WURFL enables mobile web sites and application to:<ul style="list-style-type: none">○ programmatically abstract away devices differences○ avoid the need to modify applications whenever a new device ships○ avoid the need to track new devices on the market▪ WURFL is a global database of all devices and the API to tap that information programmatically.
Applicable to	<ul style="list-style-type: none">▪ Development Tools for Mobile Devices
Reference(s)	<ul style="list-style-type: none">▪ http://www.scientiamobile.com/▪ http://wurfl.sourceforge.net/
Remarks	

5. APPENDICES

5.1. APPENDIX A: ABBREVIATIONS AND ACRONYMS

Abbreviation / Acronym	Collaboration And Productivity
OS	Operating System
AJAX	Asynchronous JavaScript and XML
REST	Representational State Transfer
IM	Instant Messenger
OSCAR	Open System for CommunicAtion in Realtime
TOC	Talk to OSCAR
XMPP	Extensible Messaging and Presence Protocol
NFC	Near Field Communication
WFRL	Wireless Universal Resource FiLe
WAP	Wireless Application Protocol
SMS	Short Message Service

5.2. APPENDIX B: RELATED DOCUMENTS / LINKS

Acknowledgement of major references for international technology standards and Specifications:

- Internet Engineering Task Force (IETF)
<http://www.ietf.org>
- International Standards Organization (ISO)
<http://www.iso.org>
- World Wide Web Consortium (W3C)
<http://www.w3c.org>

Acknowledgement of other references for international technology standards and specifications:

- American National Standards Institute (ANSI)
<http://www.ansi.org>
- Institute of Electrical and Electronics Engineers (IEEE)
<http://www.ieee.org>
- National Institute of Standards and Technology (NIST)
<http://www.nist.gov>
- Object Management Group (OMG)
<http://www.omg.org>
- Organization for the Advancement of Structured Information Standards (OASIS)
<http://www.oasis-open.org>