MindTree Mobile Testing Services

May 2011

Mobile Testing – Our Key offerings

- Provides the end to end testing services for handsets, M2M devices, tablets
- Expertise on various platforms
- Fully equipped lab infrastructure to perform protocol, application, feature testing

Device Testing
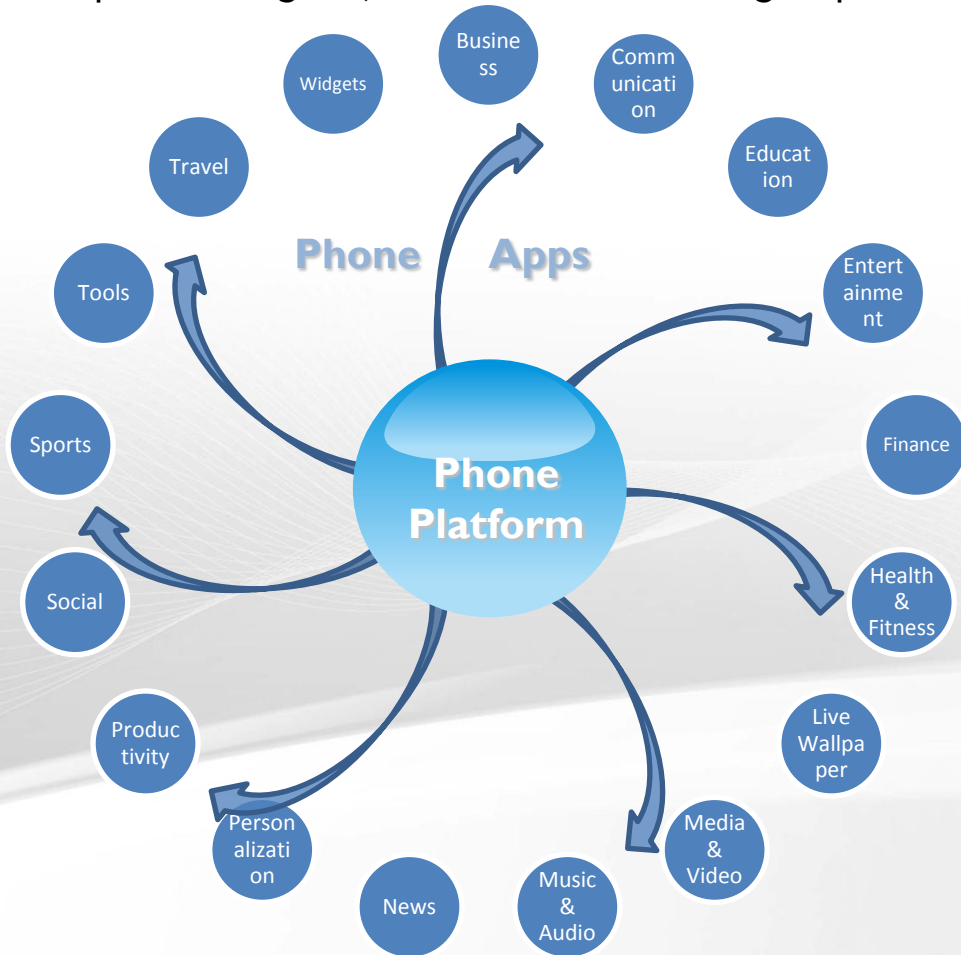
Application Testing

Pre-certification Testing

- Functional Testing
- Interactions and interruptions scenarios
- Usability Testing
- Network & Security Testing
- Performance testing

- Pre-certification testing as specified by
  - Certification bodies
  - Carriers
  - Customer requirements

MindTree experience in Phone Apps

- MindTree possess extensive experience in end to end testing of mobile phones. As part of the MindTree Phone Development Program, we have built strong expertise in testing Mobile Applications.

Phone Apps

Business
Widgets
Communication
Education
Travel
Entertainment
Tools
Finance
Sports
Phone Platform
Health & Fitness
Social
Live Wallpaper
Productivity
Media & Video
Personalization
News
Music & Audio

android | iPhone

JAVA 2ME | W@P | BlackBerry | symbian | Windows Mobile | brew

Key Highlights of our Mobile Application Testing Experience

- Tested and validated of 100+ phone targets for 50+ carriers including the Usability aspects of the phone

- Extensive validation of Mobile Applications built for MindTree In-house Android based Mobile Phone

- Have tested applications on various platforms – Android, BMP, Blackberry, iPhone, Windows etc for customers like TomTom, SMA Solar, Time Inc, P&G, Unilever etc.

- Test bank of 25000+ test cases for various Mobile applications

- Strong expertise in test design techniques supported by thorough processes and tools to mange test execution and reporting

- Tested phones for various technologies – GSM, 3G, CDMA. Test infrastructure to support these technologies

As part of the MindTree Phone Development Program, we have strong experience of GUI and Application testing on Android platforms. Below are the applications which were covered as part of testing

- Social networking, Camera, Camcorder, Media Gallery, Video Streaming, Music Player, Video Player, DRM, HTTP Downloads, OMA Downloads, Compass, Maps, SMS, MMS, Internet Tethering, Email, TTY, VPN, Wi-Fi, Browser, GPS, Notebook, Quick office, Tunewiki, Settings, Alarm, Ambient Light Sensor, Proximity Sensor, Backlight, Accelerometer, Airplane mode, Calculator, Calendar, Mass Storage, Contacts, Home screen, Touch screen, Vibrator, Calling, Image Editor, Split screen

We have been involved in delivering 50+ Kyocera phone roadmaps for various carriers across the globe, and below are the applications that were tested on BREW platform

- Phone Book, Phone features, Interaction and Behavior, Interrupt and alert Functions, Digit Alpha Entry, Calling & Call History, Settings, Service menu, Position, location & Service Programming, Camera, Camcorder, Media Gallery, Video Streaming, Music Player, Video Player, DRM, HTTP Downloads, OMA Downloads, SMS, MMS, Email, TTY, Wi-Fi, Browser, GPS, Settings, Alarm, Backlight, Airplane mode, Calculator, Calendar, Mass Storage, Contacts, Home screen, Touch screen, Vibrator, Calling

Snapshot of Key Customer Case Studies

Testing of Tune Wiki - Social media player Android Smartphone

Testing of Quickoffice® - an application suite for Android smart phones

Certification of VZW tones (Real Networks, Reston)

Testing of Yahoo! Cricket for Mobile

Testing of Apple and Android based Mobile Apps

Mobile Website Testing for a Leading FMCG Company

Guidelines and Execution Model for Usability Certification

Usability Testing of Mobile Applications

Compatibility/Interfacing

- Compatibility with device, OS versions
- Interfacing with the other applications

Performance

- Time taken to complete the tasks
- Number of steps required to complete a basic task
- Eg: Time taken to load the application, exit the application, transition from one screen to another etc

Interruptions

- Interruptions that occur while being on the application

Stress

- Ease of use when the application is really stressed to maximum usage scenarios

Typical categories for Certification

Installation	Un-installation	Web Service	File and Data management
Networking support	Version control of the binaries	Digitally signing the binaries	Digitally signing the drivers
User access and control	Privacy guidelines	Security	Reliability
Power Management	UI	Performance	Accessibility

Proposed Test Methodology

Input (Documents, Designs, Application etc) **+** Tools and Strategy (Techniques Applied to Inputs) **=** Output (Application Certification, Test artifacts, Automation Scripts etc)

Project Initiation	Requirement Analysis & Planning	Test Design	Test Execution	Certification
➢Define scope ➢Define Roles and Responsibilities ➢Effort estimation	➢Investigation, quantization of the mobile application to be tested ➢assimilate available information ➢Test Plan	➢Test Case documentation ➢Acquire devices ➢Acquire Tools and setup test environment	➢Test Case execution ➢Defect Reporting ➢Regression	➢End to End certification test ➢Critical flow functionality test on the actual device

Project Execution Models

Name	Onsite	Offshore	Coverage of Devices *	Comments
Onsite	Complete	NA	100%	Prohibitive Costs
Offshore	NA	Complete	95%	Dependency on availability of Devices and Test Environment
Hybrid	Part onsite	90% offshore	100%	Initial execution strategy with no major issues encountered
On Demand	Part Onsite + Short term Travel	Majority offshore	100%	Benefits of above + scaling benefits

* All Devices and Tools required for the testing provided by the customer

Appendix - Overview of Telecom Testing Capabilities

Overview on our experience in the Mobile Testing

- MindTree possess extensive experience in end to end testing of mobile phones including testing Applications on BREW and Android platforms, field test and customer acceptance.

- Experienced pool of Engineers, Senior Engineers, Technical Specialists on end to end product testing with profound experience in understanding of tools and test setups across CDMA, EVDO, GSM, 3G, LTE, Wi-Fi, GPS and BT technologies

- Our Phone Test team has worked along with Kyocera Wireless Corporation (KWC) in delivering the 50+ Kyocera phone roadmaps various carriers across the globe. The team was also part of the 3G phone which was developed by MindTree.

- We have a fully equipped lab for CDMA, GSM and WCDMA phone development and testing. Refer the embedded document that captures details of our phone testing experience

MindTree_Phone_Testing_Capabilitie

CDMA Protocol Testing

GPS/LBS

Field Test (CDG3) & CA

CDMA pre-certification(CDG1, CDG2)

MindTree Test Expertise (wireless devices)

Audio/AccBattery, Headset

Phone Applications (Multimedia, messaging, UI)

BT testing & pre-cert
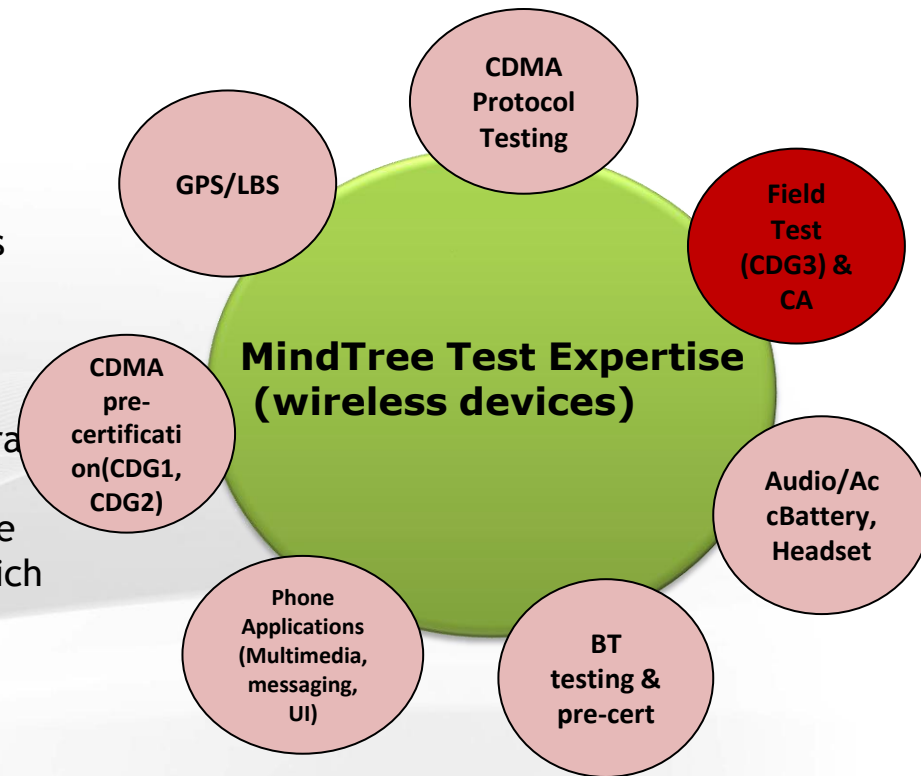
Test Infrastructure

- Lab equipped with network simulators

#	Test Area	Standard (3PP)	Test Area	Test setup Model & Make	Setup
1	**Protocol pre-conformance testing** •2G, 2.5G,3G •Inter RAT •RRM •SIM/USIM	51.01.0-1 34.123.1 34.121.1	Pre-GCF Pre-PTCRB	Anite SAT(A)-4 +RRM	
2	**Application pre-conformance testing** •MMS •Java •DRM •Streaming •email •Browsing	OMA-ETS-SUPL 1.0 OMA-ETS-MMS-1.3 OMA-DRM-V 2.0 OMA-Browser-V 2.3	Pre-GCF Pre-PTCRB	SETECOM S-CAT 6020	
3	**SIM and USIM pre-Conformance testing** •GSM, 3G, 3G USAT	ETSI TS 102 230 Digital & Analog 3GPPTS51.010-1 Digital & Analog 3GPPTS51.010-4 SAT Rel.99 stage 1 & 2 3GPPTS31.121 stage 2 & 3	Pre-GCF Pre-PTCRB	IT3 Comprion	
4	**GPS pre-Conformance testing** •GSM Minimum Performance •WCDMA RF Minimum Performance •WCDMA Signaling •GSM Signaling •SUPL Application Enabler	3GPP TS34.171 3GPP TS 51.01.0 3GPP TS 34.123 OMA-SUPL-V1.0-ETS	Pre-GCF Pre-PTCRB	Spirent ULTS-A500	
5	**Functional Testing** •Voice Call, Video Call •SMS, MMS •Browser •Streaming •DRM •Tethering •FTP •GPRS •EDGE •HSUPA •HSDPA •Handovers etc.		Feature and Functional	Anritsu MD8470	

Appendix – Mobile App Testing Case Studies

Case Study 1 - Application Testing

- TuneWiki for Android is a social media player that shows subtitled lyrics as you listen to your favorite music, watch music videos, or stream songs. TuneWiki provides lyrics for over 3 million songs, translated into over 40 languages.

As part of the MindTree Phone Development Program, TuneWiki Application was tested for the following

- Download operation & Upgrade under varied memory conditions
- Usability testing by accessing songs through different options available
- Functionality
- Sync
- Interruptions
- Validating different audio & Video codecs
- Streaming Video & Audio
- Performance
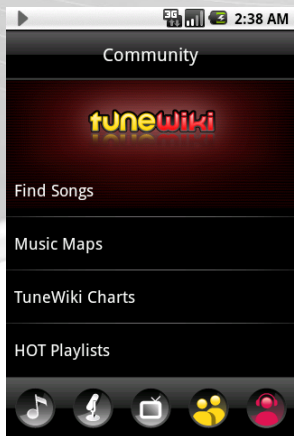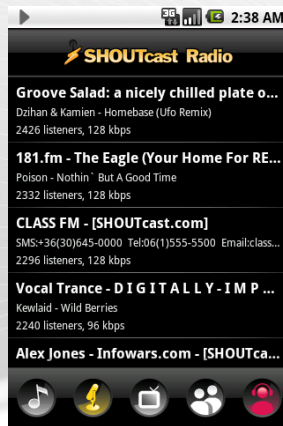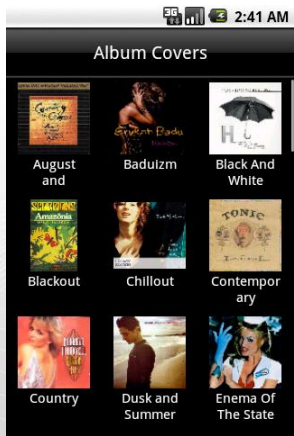
Case Study 2 - Application Testing

- Quickoffice® is an application suite for Android smartphones that can be used to CREATE, VIEW, and EDIT, Microsoft® Office files including Word documents, Excel spreadsheets, and PowerPoint presentations.
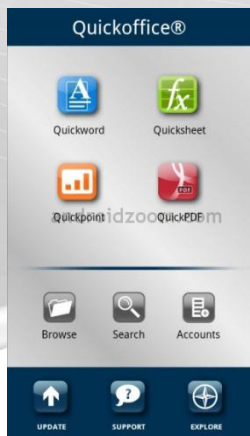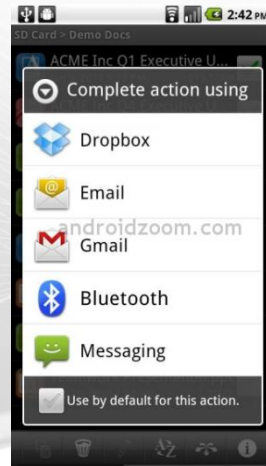
As part of the MindTree Phone Development Program, Quickoffice Application was tested for the following

- Create, open, & edit all Microsoft office files
- Clipboard access (cut/copy/paste in app and between apps)
- Performing Search operation on keywords with different sized files
- Insert and resize images from gallery or camera
- Edit and format table text in documents
- Undo / redo user actions
- Thumbnail preview scrolling for multi-page documents
- Paragraph alignment in documents
- Share files from via e-mail, SMS, Bluetooth, and others
- Add, delete, and rename worksheets in Excel files
- Apply formulas to multiple cells by tapping and dragging
- Move & resize text boxes, images, and shapes

Case Study 3 - Mobile Website Testing for P&G products

Background

- P&G is a CPG company with a market capitalization of about ~$150 billion, making P&G one of the 10 most valuable companies in the United States.
- P&G wanted to have mobile websites across different resolutions which are part of Top Ten mobiles list from
  - http://metrics.admob.com/2009/10/september-2009-mobile-metrics-report/
- Vision of this project was to deliver bug free website which renders on phones with different resolutions.

Solution

- In P&G there were no projects in mobile space. Initially a PoC was done to showcase our ability to the customer. Customer was happy with our capabilities which helped us to win the business.
- PhP code was developed for mobile websites to rendered properly on phones.
- 3 member team completed the development and testing in 2 weeks for High, Medium and Small resolutions.

Challenges

- There was major challenge to fit the content and images in Lower resolution phones which are of 128 pixels (Nokia6230) and testing the same on the phone took lot of time due to the slow internet connection on phones.
- For High resolution phones like I-phone and Android based phones we used SIM cards initially for connectivity which increased the testing time due to slow connectivity issues. This was mitigated later by using Wi-Fi Access point for faster connectivity.

Business impact

- Enabled the Customer to meet time to market without compromising on Quality
- P&G has expressed its confidence in Mind Tree by giving 4 more projects

Case Study 4 - Yahoo! India Cricket QA

1. Background

- Yahoo! is the leading global brand that creates deeply personal digital experiences using technology, insights based on data, and intuition to bring together personally relevant content and experiences from across the Web. It provides its consumers across the globe simple, trusted ways to connect with the people, communities, topics, and trends that matter to them most.

3. Solution

- Review Requirements
- Create and execute test cases
- Defect Analysis
- Benchmarking, Performance and Functional testing
- Feature and performance comparison with similar products

2. Scope

- Yahoo! Cricket for Mobile: Get the schedule before the match, live scoring during, and the results as they happen. View the score summary, headline news, photos and trivia—all from one page
- View player photos and in-depth stats; plus read interviews about current action
- Browse photo albums of matches, players and special events
- Get details of ongoing series with a micro-site designed just for that series
- Get scores auto-refreshed for live matches (available on select devices)

4. Technology Used

- C,C++,Java
- Proprietary tools and frameworks

5. Supported Platforms

- Symbian
- Android
- Bada
- SHP
- S40/S60
- Java/J2ME
- iOS
- Blackberry etc

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Testing of Apple and Android based Mobile Apps

BACKGROUND

- **Time Inc., a Time Warner company**, is one of the largest content companies in the world.

- Since April 2010, Customer is developing a commerce gateway for the user management services for there upcoming mobile and existing web interfaces; Along with this they want to launch a couple of mobile APPs in the Apple IOS and Google Android platform.

- MindTree team had done a commendable job during the earlier ecommerce project and they wanted to leverage our e-commerce expertise in to the CGI and Mobil APP testing

CHALLENGES

- CGI and Mobile APP was an alien world for the e-com team, totally different from what they have done during the e-commerce testing .

- As UI wireframes were keep on changing for iPhone/iPad and Android platforms and there was lot of re- design& re work of test cases involved and we need to follow up for confirmation of changes

- There were build issues while executing on the simulators and also dependencies on TringApps for the Certification builds to make it work for simulators/Emulators we test out at offshore.

SOLUTION

- MindTree ramped up the offshore team that was part of the e-commerce application testing for testing of mobile applications with the help of Mobile Application Testing SME

- The team learnt the apps (Time, People, Life Wall Paper, Sports Illustrated, Real Simple) in no time, evaluated the best tools to be used to set up the environment at offshore (iPhone, iPad, Android & Blackberry emulators, Device Anywhere) and hooked to customer system.

- The team also created new templates for test cases, wrote test cases and finally executed the test cases within the committed schedule.

- Team Size – 5, No of Test Cases - 3000+, Project Duration – Apr 2010 till date

BENEFITS TO CUSTOMER

- The Application was launched on time and with excellent quality. The People Android APP was one of the featured APPS in the Android market with a user experience survey rating of 5 out of 5 (excellent).

- Inspite of communication challenges and lack of clarity on the requirements, MindTree team is able to coordinate with third party vendors like TringApps who work in a different Time Zone and are able to deliver the applications on time.

Our Mission

Successful Customers

Happy People

Innovative Solutions

www.mindtree.com