**One of the world's largest mobile handset manufacturer**

**Challenge:**
- Testing of a mobile handset application framework & UI
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**Solution:**
- Call-handling and other mobile applications (using Indian network for GSM/GPRS, RACAL test equipment for CDMA and client network for WCDMA tests)

**Benefits:**
- Increased testing efficiency using automation tools thereby reducing time-to-market and resulting in long term cost reductions
- Comprehensive test cases to ensure adequate test coverage

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**One of the world's largest chipset vendor and leaders in CDMA technology**

**Challenge:**
- 3G WCDMA mobile handset testing based on various standards
- Test Design development anticipating new specifications and future releases
- Drastic offshore co-ordination - multi-location development & test team
- Testing JSRs that are relatively new to mobile market
- Developing midlets to test the interaction between Java and modules including GPS, Bluetooth and media player

**Solution:**
- Java platform testing including
- Java feature testing, system testing, technology compatibility, kit testing (TKT), JSP testing, embedded Java, applications testing
- Connectivity Applications testing including
- Bluetooth, 3G and USB
- PTT - PoC feature testing

**Tools used**
- QXDM, QPST, J-TAG, Ethereal, Setcom SCAT-5020, TCK
- GEM/Mprise Casefile SIM toolkit, Poc Simulator, proprietary tools

**Benefits:**
- Domain expertise
- Reduced time to market

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**Testing as Managed Services (TMS)**

**Wireless Testing Services**

**Wipro works with 9 out of the top 10 handset and network element vendors**


Wipro has proven expertise in all areas of mobile handset testing for all networks.

**Wireless testing services includes:**
- Host based testing used for testing protocols and applications.
- Functionality and performance verification of different handsets.
- Interoperability and field testing
- Comprehensive test cases to ensure adequate test coverage
- Use test cases, minimizing customization.
- Wipro has proven expertise in all areas of mobile handset testing for all networks.

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**The portfolio of services includes testing and consultancy in the following areas**

- Protocol tests
- System level functional/performance tests
- Platform tests
- OS release tests
- Component integration tests
- System tests
- Verification of new features & applications
- Regression and stress/load tests
- Interoperability and field testing
- Inter-vendor benchmark testing
- IOT and operator tests
- Test automation
- Process automation
- Execution automation
- Test solutions for mobile handsets & infrastructure
- Contribution to technology forums and conferences

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**Wall of Fame**

**Sanjay Seth, Wipro Technologies, INDIA**

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Tel: +44 (0) 20 7387 0606.

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Benefits

- End-to-end mobile handset and network element testing
- Pre-certification testing of new mobile handsets and network elements in areas of:
  - DRA conformance
  - Functional, system, performance tests
  - Protocol testing
  - Quick ramp-up of team
- Time to market: through readily available test solutions:
  - Ready to use test cases
  - Readily available test set-up
  - Automation framework and test management system
- Cost benefits:
  - Lab-on-hire: sharing of test environment
  - Minimal customization of test cases
- Assured quality of deliverables:
  - Continuous improvement in productivity through our solutions and tools
  - Flexible business models

Test Automation Solutions

Automated testing is the key focus area of the Wireless Lab to enable faster test execution cycles and reduces risk associated with manual test execution. The lab provides test automation solutions to handle different handsets and applications:

Environment set-up to test 2G, 3G & 4G mobile and network applications and protocols for:

- GSM CSD
- GPRS
- CDMA
- IDEN
- EDGE
- UMTS
- PDC
- Wi-Fi
- WMAX

Test coverage includes:

- Application testing
- PIM, calculator
- Widgets testing
- Emulated UI automation using WinRunner
- Protocol testing
- Automation using TTCN & AT commands
- Call features and messaging automation
- Mobile browser testing
- Java testing

Tools:

- Third Party Automation tools
- In-house Mobile Test Automation tools

Wireless Test Automation Tools

- Browser Test Automation Tool
  - Provides the framework to execute all browser test cases in sequence and make sure the results are consistent
  - Mobile browser testing

- J2ME Test Automation Tool
  - Provides a test framework for J2ME functional test automation
  - Integration with test management systems and enhancements to achieve end-to-end J2ME test automation are planned

- Automation Test Framework using AT commands
  - Achieves test script abstraction to handle multiple handset platforms/variants and reduces test script maintenance cost

Test Management Solution - TestBrix™

A web-based solution, addressing the needs of a global delivery model, TestBrix is a platform-neutral, workflow-based solution, built on J2EE technology. It supports automatic execution of tests on remote targets and provides graphical, real-time monitoring of test execution progress.

Application Expertise

- PIM
- Calendar
- To Do
- SMS
- EMS
- MMS
- Email
- Security
- Performance
- TCK
- Games
- OTA
- Camera
- Com. Codec
- Flash Storage
- File System
- Persistent data handle
- Push
- Browser
- WiMax
- WAP
- HTML/HTTP
- Access Point
- Wi-Fi
- IDEN
- CDMA
- EDGE
- GPRS
- GSM

Lab Capabilities – Applications, Servers & Tools

- MMSC
  - MMSC (v1.2)
  - MMSC Simulator – Developed by Wipro
- WAP Gateway
  - WAP Gateway (v2.0)
  - Push Proxy Gateway
  - PPG Version 2.0
- SyncML
  - Developed internally by Wipro (v1.2)
  - Supports Data Synchronization and Device Management
- DRM
  - Developed internally by Wipro (v1.0)
  - Supports forward lock, separate delivery, super delivery and combined delivery
- Email
  - Email server 5.2
  - Supports SMTP and POP3
- IMPS
  - Developed internally by Wipro
  - Supports Instant Messaging, Presence & Groups
- PoC
  - Developed internally by Wipro
- Tools
  - Ethernet Version 0.10.2
  - Nokia Content Publishing Tool Kit Version 2.1
  - Apache & Tomcat Server
  - Push Initiator developed by Wipro
  - TTCN
Benefits
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- Load build & integration
- Defect tracking

Solution:
- Call handling and other mobile applications using Indian network for GSM/GPRS, RACAL test equipment for CDMA and client network for WCDMA tests
- Tools used
  - Client's proprietary tools
  - Defect tracking system (Bugzilla)
  - Source code control system (ClearCase)
  - RACAL CDMA test equipment
  - Rhodos & Schwartz test equipment
- Test Automation
  - MIN runnner based capture-replay automation for PC emulator based testing
  - Python script based automation
- AT command based automation

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From the handset and network element testing perspective Wipro’s engagement with leading handset and network element vendors and leading service providers has involved one or more of the following types of testing:
- Functional/System
- Regression
- Stability & Performance
- Interoperability & Field
- Conformance & Type Approval
- Test Automation
- Adversarial

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