# Paul L Petronelli

# Mobile Applications Development

Capabilities and experience
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# Experience

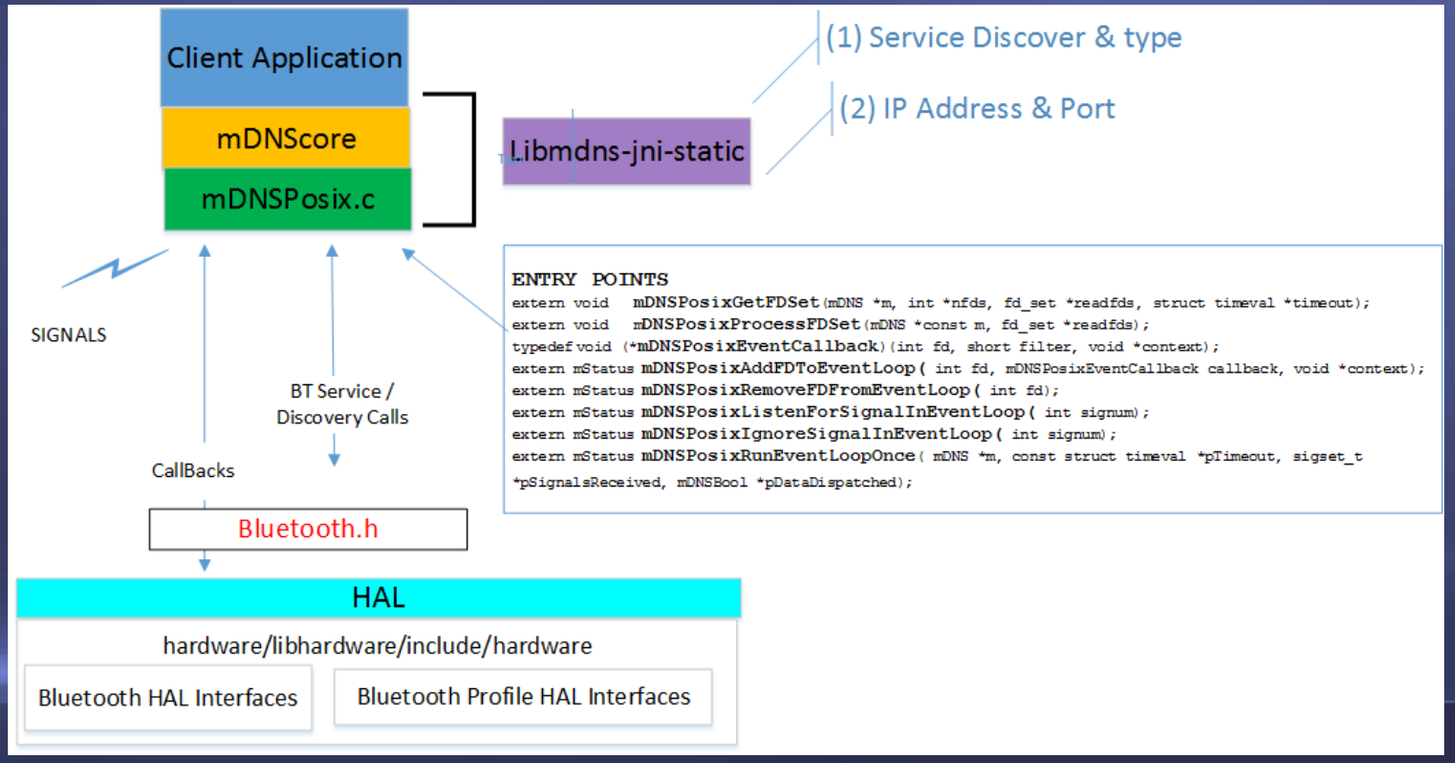
- Variety of Real Time OS
  - Green Hills
  - VxWorks
- Mobile / Wireless Applications
  - Handset platforms: iOS, Android, iPhone, Java
  - Full Stack development
- Embedded system development, both server and client
- Android AOSP based development
- Implementations using key protocols
  - RS 485
  - ZigBee
- Low level development, test and integration with Cygnal, Lauterbach, Jtag, Freescale, etc.
- Sensors used – GPS, accelerometer, touch screen, IR
- Wearables: Google Glass

# AOSP Development

- Goal: Develop proof of concept to transmit microcode update files to iOS and transmit over Bluetooth to Android wearable.  Replace BlueDroid protocol stack with BlueZ stack.
- Achievements
  - Build Lollipop and Marshmallow from AOSP sources using Ubuntu platform
  - Replace BlueDroid with BlueZ stack
  - Flash handset with new stack and primitive file transfer app
  - Implement BT file transfer app in iOS
  - Benchmark deployment

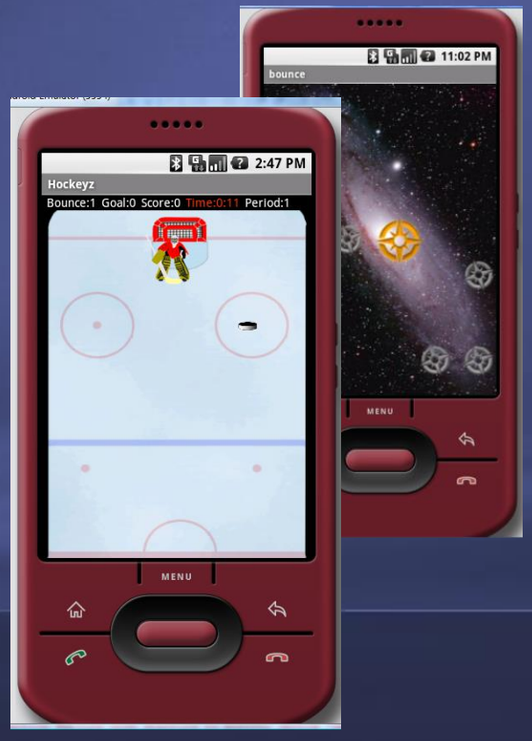
# AOSP (continued)

- Kernel interface to HAL via Bluetooth.h
- Lollipop kernel proved too buggy
- Conversion to Marshmallow resolved many issues
- iOS BT con.
- Proved unreliable
- Benchmark
- Acceptable



# Android Developments

- NetPeek® Network monitor
- Handset applications
- Games
- Multi-body gravity physics package
- R&D on Android kernel for driver development and device support
- Eclipse Ganymede development

# Handset Developments

Developed a number of products for the handset market as well as conducting R&D on a wide variety of handsets and handset operating systems. Product development has been done on Symbian, Android SDK , Java J2ME/MIDP/CLDC, Windows Mobile, and Rex. These developments gave me an appreciation of the constraints engendered in small footprint platforms as well as a deep understanding of the technologies involved, such as ARM, Jazelle®, 3G modems, etc.

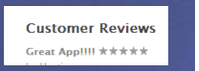
- **Android** –have implemented several products, including games, for this platform as well as a complete multi-body physics package. The NetPeek application has won acclaim and was ported over to Intel Atom® platform for CES 2010.
- For Qualcomm, implemented the Kilobyte Virtual Machine KVM) for the Qualcomm handset. To support the complete set of MIDP and CLDC Java graphics, had to extend the native REX support. The deliverable to Qualcomm was the KVM, demonstrated at JavaOne, as summarized below:
  - Developed KVM from Sun Sources
  - Implemented additional graphics support
  - Integrated with SABRE air reservation system
  - Developed applications to test KVM

# Handset Developments (cont.)

- In addition the BREW-KVM interface was designed, a number of BREW applications implemented and the interface to ARM's Jazelle® Java Accelerator was supported.
- For Aviga, implemented a distributed speech recognition product using Windows Mobile
- As a demonstration for another new startup, implemented a video streaming application in Symbian. Working with Nokia's development team in Finland an early release of Nokia's 90 series handset was used.
- Am a development partner of Gemalto, and have used their SDK to implement a Smart Card Web Server (SCWS) for GSMA
- Under contract to Danger, implemented the following:
  - SIM Toolkit research for Full Type Compliance
  - Factory Programmer, a USB driver to load firmware into Danger handsets

# iPhone Developments

- Architect & project lead for:
  - American Outdoorsman
  - SEAL Heroes: Pirate Takedown
- Design and development for iPad medical system application

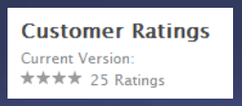










Reviews:



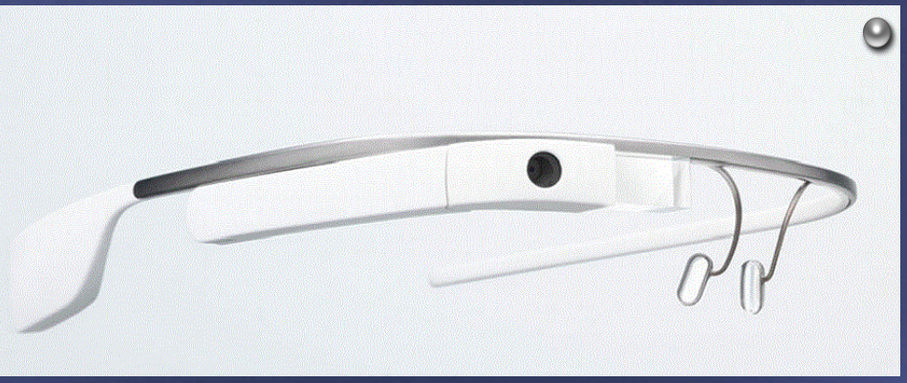
# iPad Developments

- Haptic User Interface
- Health Information Exchange market space
- Complex Web Services interface for display and processing of medical information

  - HL7 message handling
  - Designed user interface and server Web Services components
  - Designed overall security architecture to be compliant with HIPAA, HITECH and NIST 7497

# Glass Product Development

**Physicians Heads UP Display**



This display presents key medical information to the physician based on the patient's medical records. Alarms and alerts are highlighted. Secure storage of the PHI is provided when linked to a server or handset secure application.

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**Network Manager Heads Up Alert Display**

- This application presents network operators with current, actionable alarms affecting the network. Security is provided at the link level.

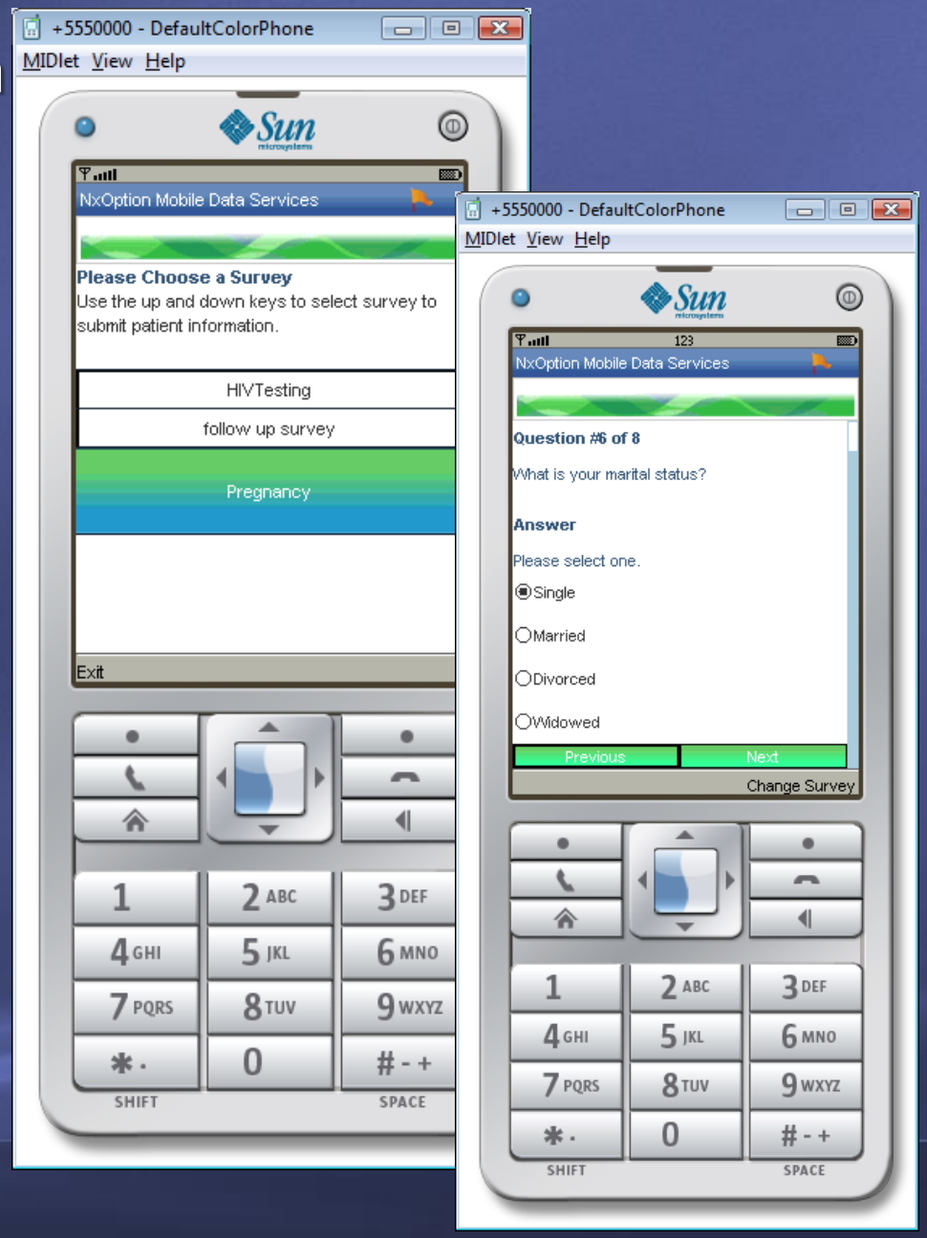
**First Responder Action Glass**

- This wearable Google Glass® headset presents map information, warnings, evaluation routes, alerts received from law enforcement as well as instructional videos on "how to" perform first aid, fire rescue, etc.

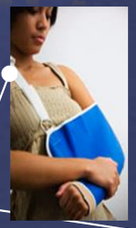
# Field Medical Data Collection Demo

*These developments specifically targeted low end handsets.*

- Field collection of medical information using structured forms on low end cellular phones
- Uganda midwife and clinicians gathered data
- Central site consolidated information and analyzed
- Supports imagery and data
  - Photograph of patient often required for identification
  - Image of injury or other contributing factors
- Use Cases
  - Pregnancy Treatment
  - Pandemic Episode



# Forms Driven Data Collection

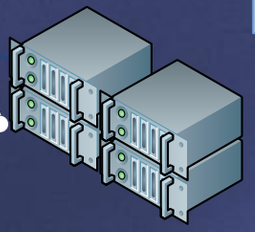


1. Image Face
2. Image Injury

**Field Worker**

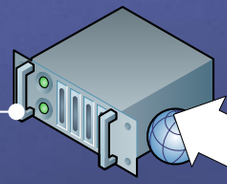
Treatment Notice

Send Alert



Edge Server

**Treatment Notice**
please seek medical attention for arm fracture at the Banglaquda Clinit

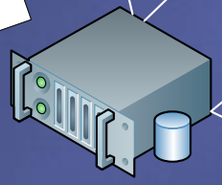


**3rd Party Proxy**

Medical Record
<Mrs X>

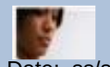
Date: ss/ss/ss
Broken Arm

Initial Record



Medical Db

Medical Record
<Mrs X>



Date: ss/ss/ss
Broken Arm

Updated Record

Clinic

Extension Worker

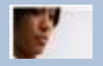
**Treatment Alert**
<Ms X> scheduled to visit Banglaguda Clinic

3. Update to Medical Record

3. Send Update to Medical Record

3. Image X-ray

Medical Record
<Mrs X>



Date: ss/ss/ss
Broken Arm

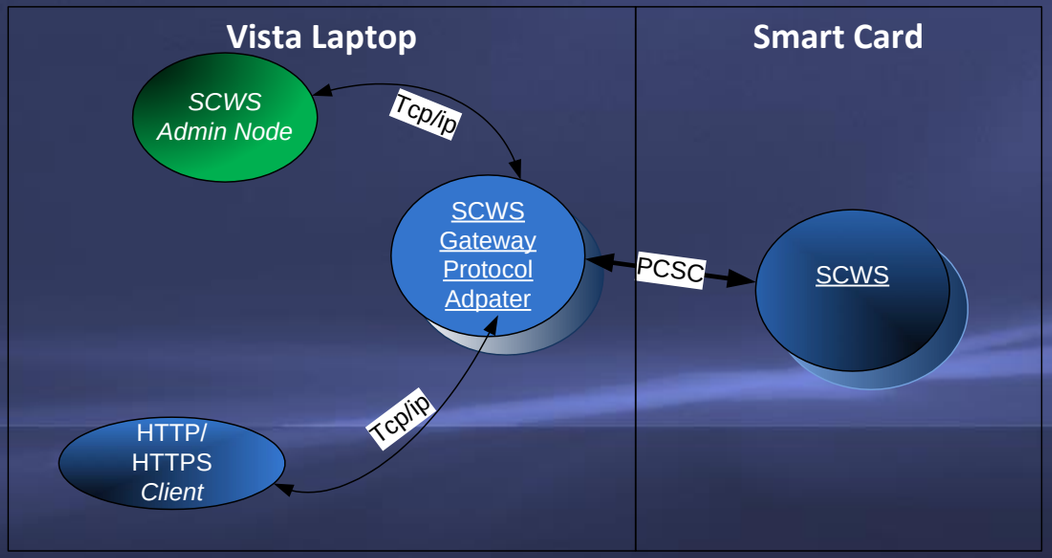
**Public Internet**

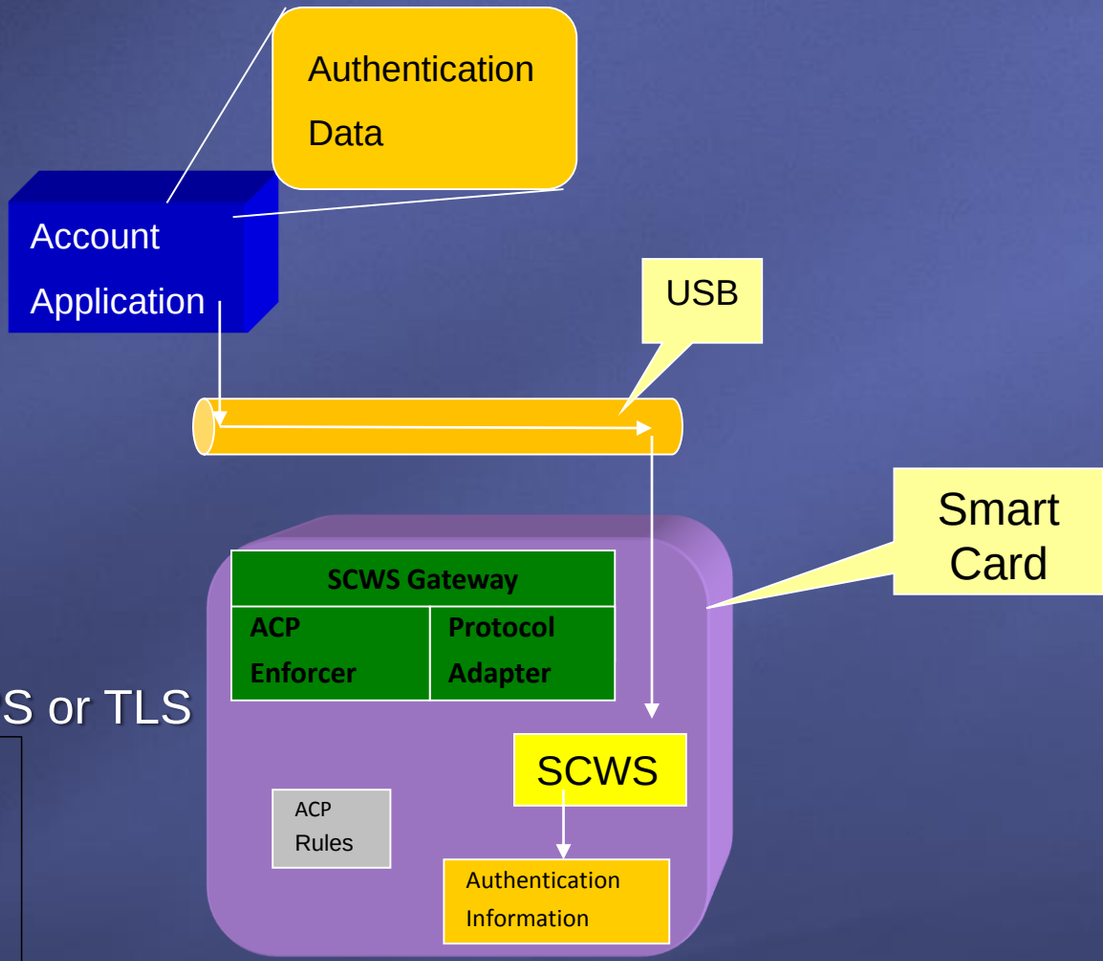
V0.4-4

# SCWS Secure Channel Demo

*Demonstrate secure connectivity between host application and SCWS using standard Vista libraries*

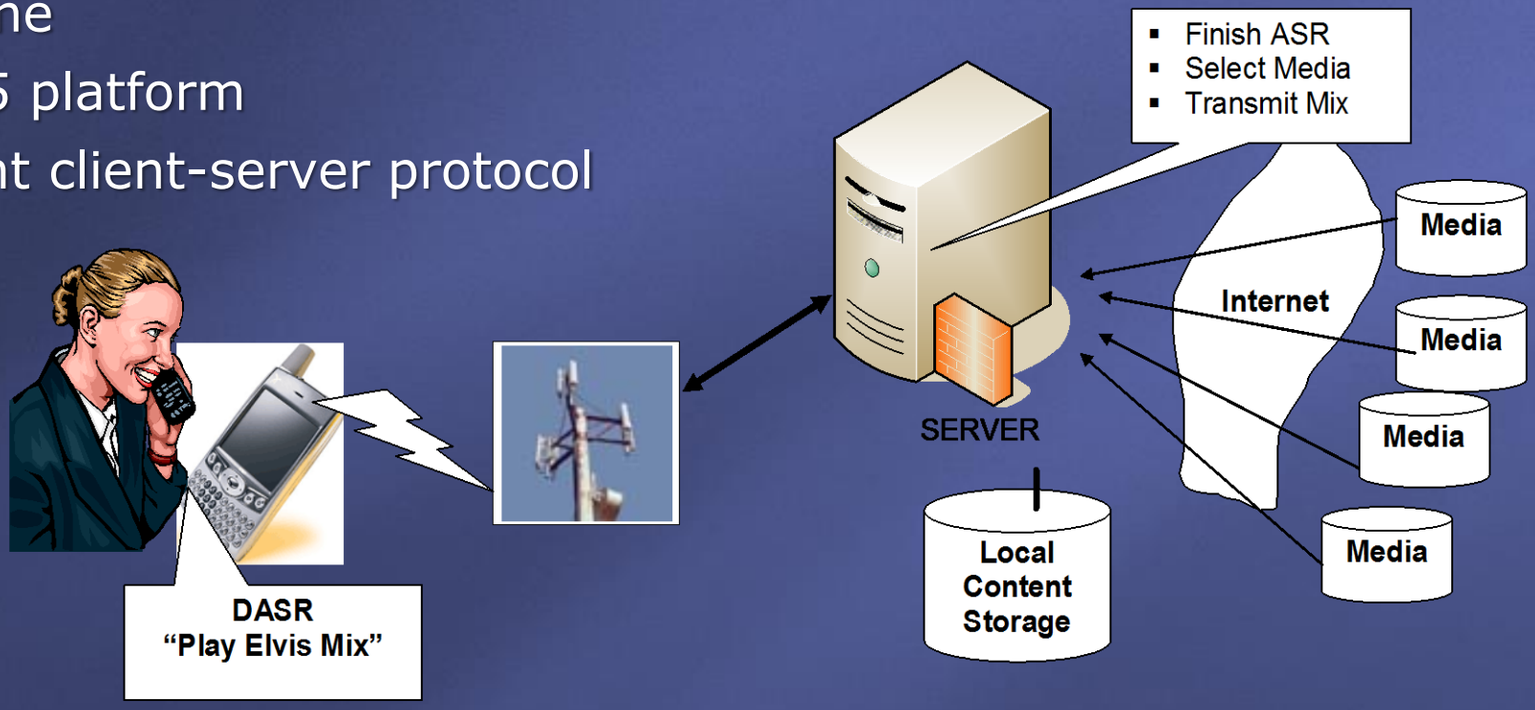
- Uses DOT Net Smart Card Infrastructure
- Used PC/SC through gateway
- Demonstration goals achieved:
  - Standard Libraries (IE)
  - Gateway provides routing knowledge
  - Application <-> SC Application
- Further objectives
  - SCWS interface over USB/EEM channel
  - Secure communications based on HTTPS or TLS



# Windows Mobile Distributed ASR

- Voice capture at handset
- Some local analysis
- Centralized ASR engine
- Windows Mobile 2005 platform
- Design and implement client-server protocol
- Treo Smartphone



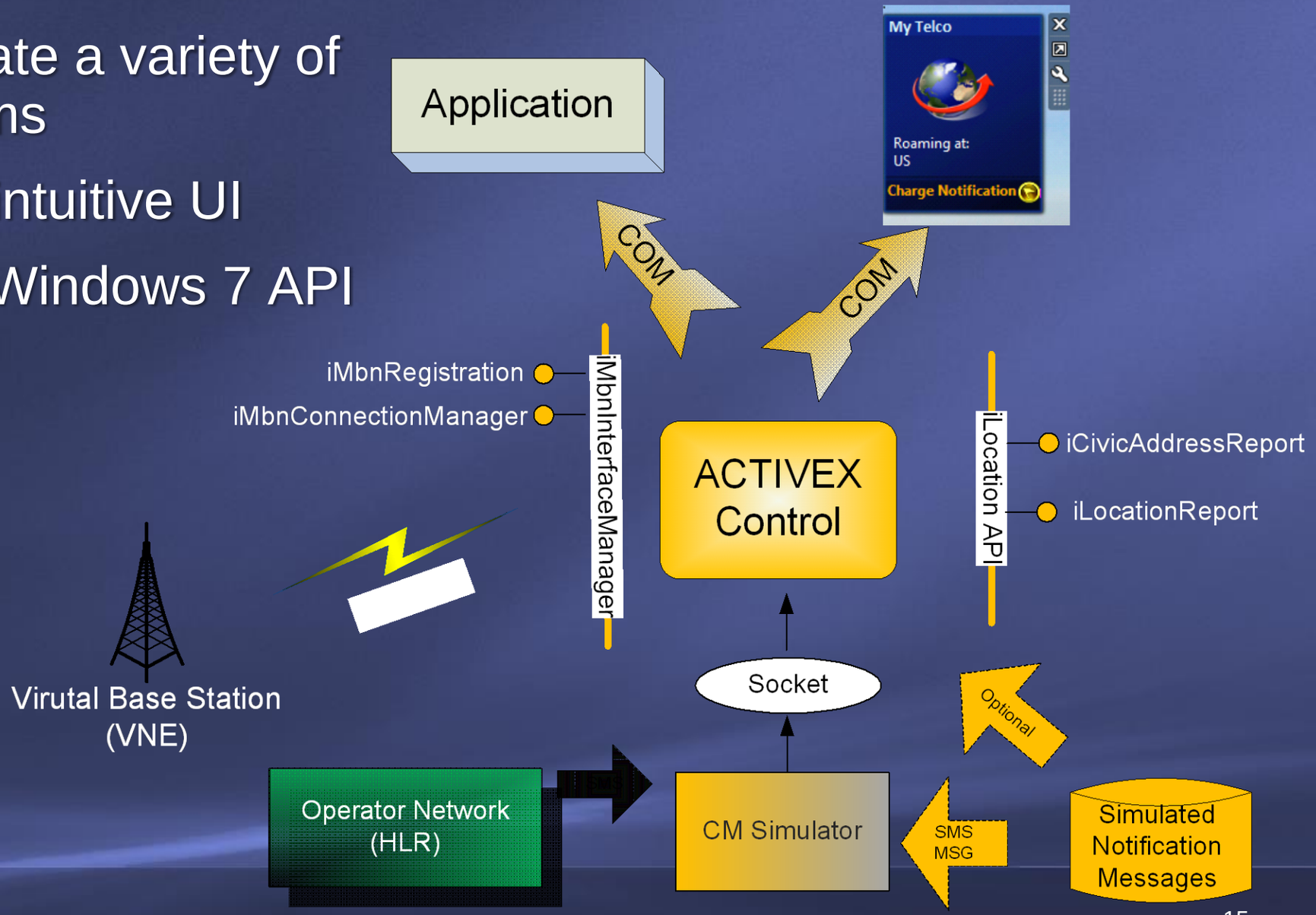

- Media distribution and streaming application
- GUI design and implementation
- Interoperability of MS SDK with 3rd party application

Test and Evaluation Involved

- Active Sync
- Windows 3G network interface
- Windows WiFi interface
- Connection Manager

# Test Bed for Inbound Roamers

- Can simulate a variety of mechanisms
- Illustrates intuitive UI
- Based on Windows 7 API features



# KVM Implementation for CDMA

Manufacturer IP

Vertical Application

Frame-work

PDK

Java Wrappers

MIDP

CLDC

API

KVM

OAM

Abstraction Layer

zRex

MSM5100

MSP1000

PALM Concept

MIDP Applications "MIDlets"

MIDP

CLDC

KVM

OS

Sun Standard

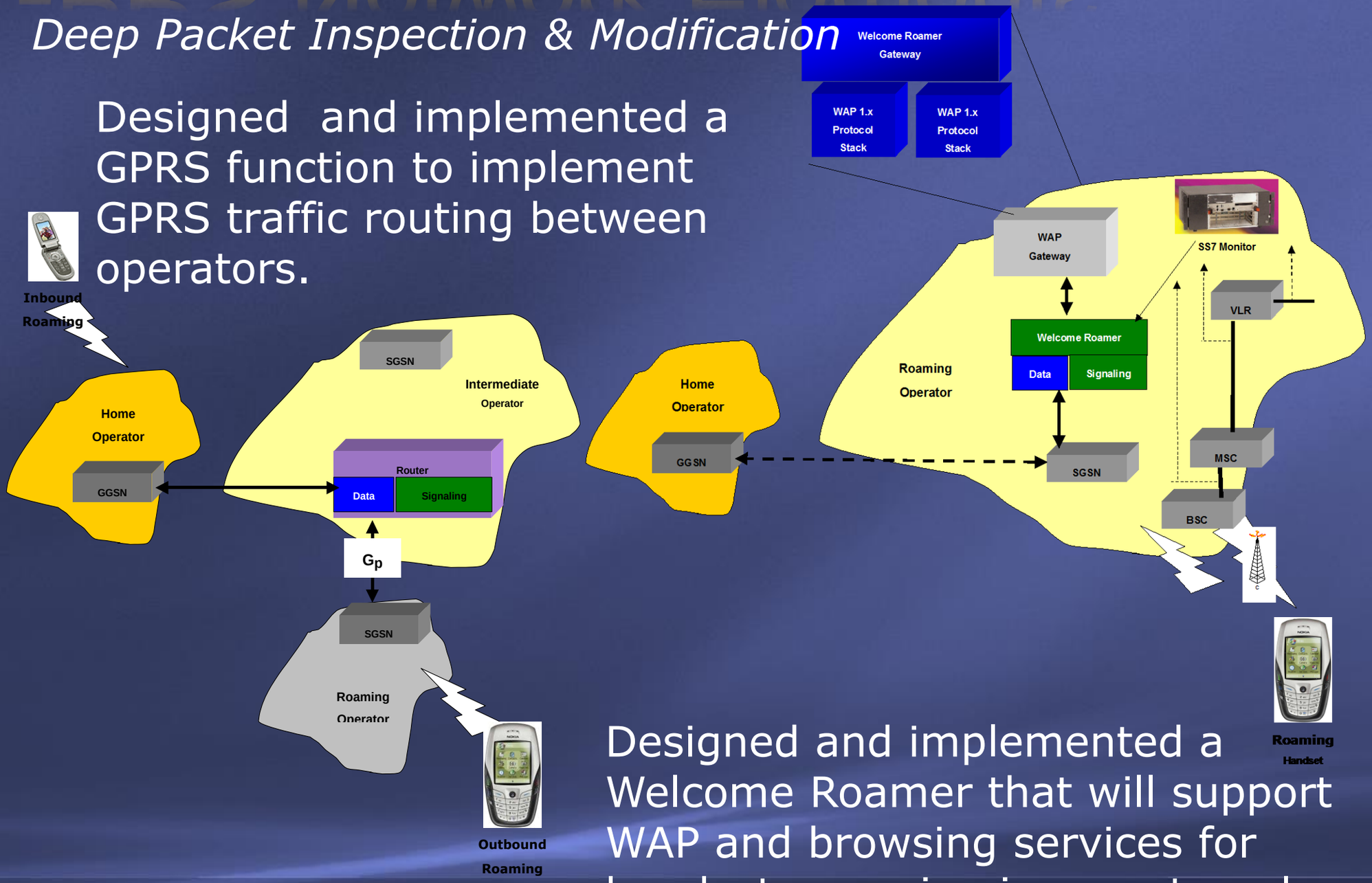


- Designed PALM abstraction layer
- Ported Sun code to zRex Platform
- Integrated Saber reservation application and demonstrated at JavaOne

# GPRS Network Elements

*Deep Packet Inspection & Modification*

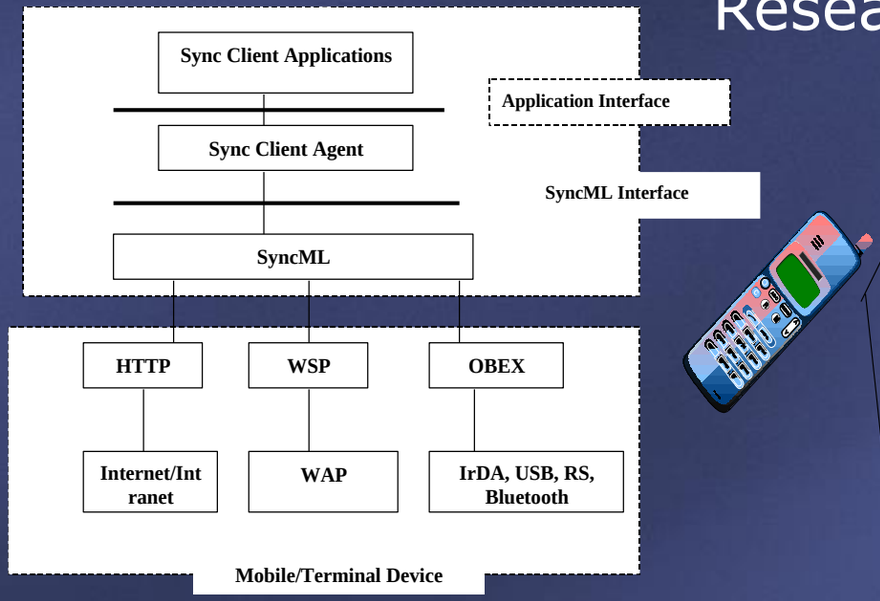
Designed and implemented a GPRS function to implement GPRS traffic routing between operators.



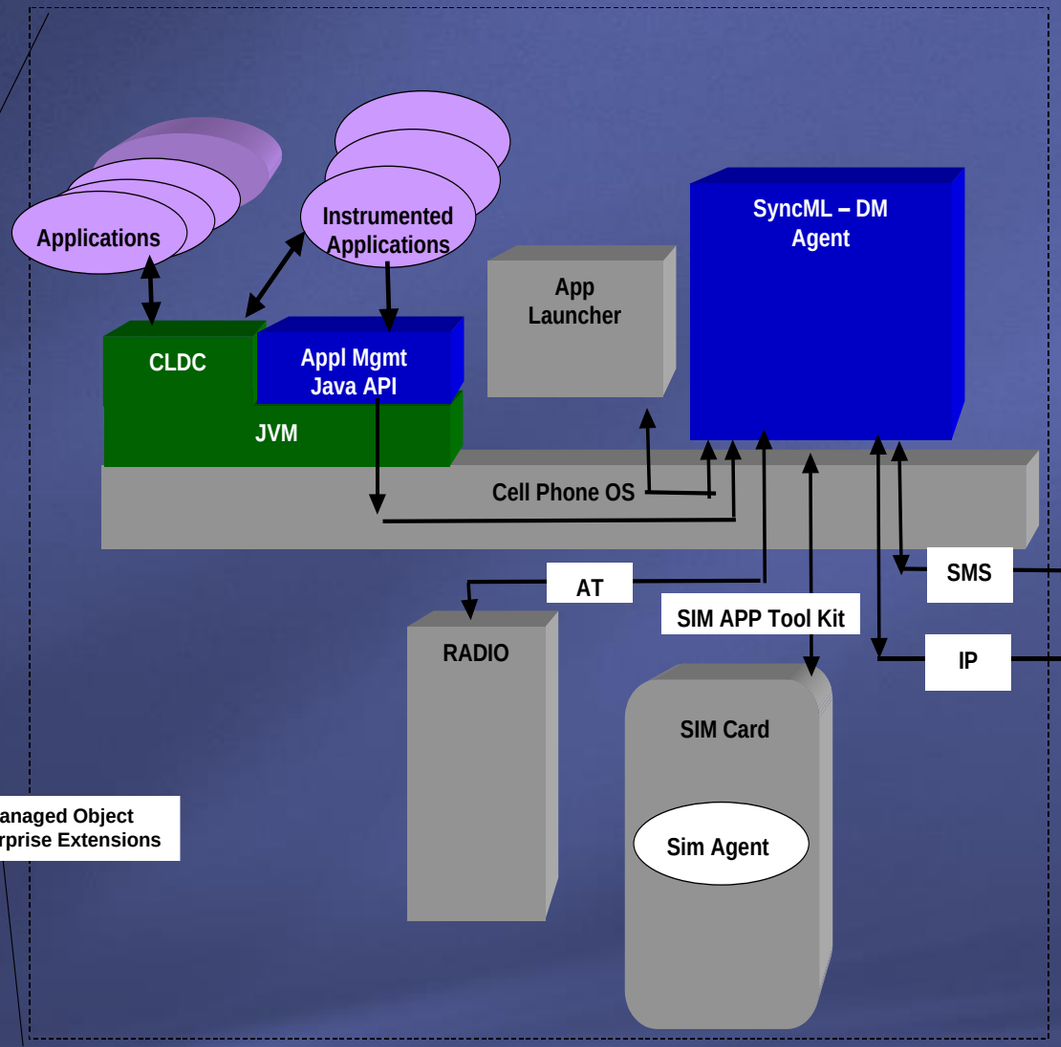

Designed and implemented a Welcome Roamer that will support WAP and browsing services for handsets roaming in an external network.

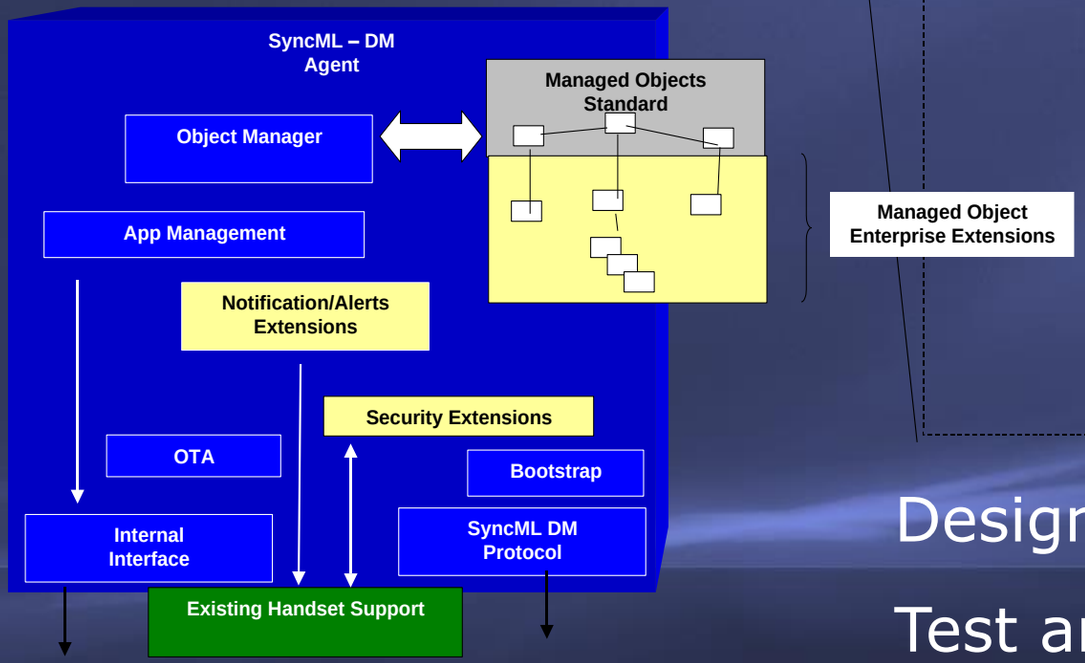
# OMA DM Agent

## Research SyncML Standard






Designed and Implemented Agent

Test and evaluated product

# Contact Information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