Design of a Handset for the IP Multimedia Subsystem
A Case Study

James Sunil Selvam
ITTIAM Systems
james.selvam@ittiam.com
Hardware Block Diagram

TI Innovator Kit based on OMAP1510
Customised Hardware Based on OMAP™ Innovator Kit
Implementation

Hardware
- Block Level
- Circuit Design
- Artwork
- TI Innovator + Custom Hardware

Software
- Kernel Related
  - Linux 2.6.16
  - Kernel Dep.
  - Driver
  - Test Programs
- Device
- SIP: oSIP
- RTP/RTCP: oRTP
- Audio Codec: G711, SPEEX, GSM
- Management of SIM
- Air Interface: GM47
- Application Services
  - VoIP: Linphone UA
  - GUI

Ergonomics
Packaging
ID
Test Setup

SIP Proxy & Registrar

Ethernet

Linphone UA

IMS Handset

Linphone UA
Test Setup

GSM/GPRS Network

Security APN

DHCP server

Internet APN

Internet

Web server with customer application

Minds in Motion

Technology for Innovators

Texas Instruments
Integrated Product
Design of a Handset for the IP Multimedia Subsystem
- A Case Study

James Selvam
ITTIAM Systems (Pvt) Ltd
Part 1: IMS
Why IMS?

• Internet
  – Ease of service creation & provision
  – Open protocols & large professional talent
  – Wealth of information

• Cellular World
  – Service on the move
  – Popularity among common man

• IP Multimedia Subsystem
  – Good of both worlds
IMS Framework

- 3GPP standards
- Architectural framework for IP multimedia services to end users
- Framework supports
  - Establishing, maintaining and tear down of MM sessions
  - QoS aware
  - Packet and circuit switched interworking
  - Roaming
  - Service control
  - Rapid service creation
  - Access independence
IMS Architecture

- Application Layer
  - OSA AS
  - OSA-SCS
  - SIP AS
  - IM-SSF
- Session Control Layer
  - HSS
- Transport Layer
  - GPRS, CDMA
  - 802.11, DSL
  - SIP
  - Media Gateway
  - PSTN
  - MGCF
- EndPoint
  - PTT, IM, VVoIP
  - VoIP
  - VoIP

PTT, IM, VVoIP

Technology for Innovators™
Protocols Involved

• SIP : Session control
• Diameter : Authentication, Authorization and Accounting
• COPS : Transfer policies between PDP and PEP
• H.248 : MEdia GAteway COntrol (MEGACO)
• RTP & RTCP : Audio and Video streaming
Part 2: IMS Handset
IMS Handset - Hardware

- MM Processor
  - DSP + Control
- Interfaces
  - I2C, SPI, USB
  - Serial, Ethernet
- Peripherals
  - LCD, Touchscreen, Keypad, CODEC

- Air Interface
  - GPRS/GSM
  - CDMA
  - WLAN
- Power Management
- Video/Audio
- SIM/USIM/ISIM
Hardware Block Diagram

- Processor
  - Audio Codec
  - MIC
  - Speaker/Headphone
  - GSM/GPRS
  - WLAN
  - Board Control Reg
  - USB
  - Flash/SDRAM
- LCD/Touch Screen
- Keypad
- JTAG
- Serial
- Power
- MIC
- Speaker/Headphone
- GSM/GPRS
- WLAN
- Board Control Reg
- USB
- Flash/SDRAM
- Audio Codec
- Processor
IMS Handset - Software

- Real time OS
  - TCP/IP stack
- SIP Client
- RTP/RTCP
- Diameter client
- MM Codecs
- GUI
Design Elements

Hardware
- Block Level
- Circuit Design
- Artwork
- Fully Integrated H/W

Operating System
- Kernel Dep.
- Driver
- Test Programs
- Device
- Kernel Related

Software
- SIP
- Diameter
- RTP/RTCP
- Audio Codec
- Video Codec
- Management of SIM
- Air Interface
- Power
- Application Services
- VVoIP, Presence
- Instant Messaging, etc
- GUI

Ergonomics

Packaging

ID
Part 3: Case Study
Hardware Block Diagram

TI Innovator Kit based on OMAP1510

- Processor
- Audio Codec
- MIC
- Speaker/Headphone
- GSM/GPRS
- WLAN
- LCD/Touch Screen
- Keypad
- JTAG
- Serial
- Flash/SDRAM
- USB
- Board Control Reg
- Power
- Speaker/Headphone
- MIC
- LCD/Touch Screen
- Keypad
- JTAG
- Serial
- Flash/SDRAM
- USB
- Board Control Reg
- Power
Customised Hardware Based on OMAP™ Innovator Kit

- **POWER CONVERTERS**
  - 5V
- **LEVEL SHIFTER**
  - 5V
  - 2.75V (LEVEL SHIFTER)
- **SIM CARD**
- **GSM/GPRS**
- **MIC**
- **SPEAKER**
- **USB TRANSCEIVER**
  - 3.3V
- **NOISE SUPPRESSOR**
- **DWL-G122 WLAN**
- **UART2**
- **5V**
- **INNOVATOR INTERFACE CONNECTOR**
- **WLAN**
- **3.3V**
- **GSM/GPRS**
Implementation

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- GSM/GPRS Network
- Security APN
- Internet APN
- DHCP server
- Internet
- Web server with customer application
Integrated Product
Conclusion

• Could demonstrate the following functions of IMS on handset:
  – VoIP Session
  – Sessions over CS & PS networks
  – New service creation possible
  – GPRS/GSM/LAN capability

• OMAP™ platform found to be a good candidate for a multimedia processor
Thank You

james.selvam@ittiam.com
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