Multimodal devices: at home, at work, on the go

James Warden, Research In Motion, jwarden@rim.com
Arnold Sheynman, Research In Motion, asheynman@rim.com

18 -19 November 2008 - ETSI, Sophia Antipolis, France
The meaning of Multimodal
Focus of this presentation

- Applications, Features and Services that can be developed because there are multiple radios available:
  - In the device
  - External to the device

- Not on unique user interface types for devices
The meaning of Multimodality

Multimodality is a concept that allows mobile device users to seamlessly switch among different mobile technologies as well as modes of interaction based on the context, certain criteria and constraints.
Introduction to Wireless
Wireless is all around us

- Car remote controls
- Cordless phones
- Cellular phones
- TV remote controls
- Access points
- Wireless accessories
Wireless has cut the cords

- Matching the multimodality of devices to the multimodality of our lives
Wireless technology categorization

- **Range**
  - Relatively Long Range
    - Cellular based (e.g. GSM, CDMA, etc.)
  - Short Range
    - Bluetooth, Zigbee, NFC

- **Data Rates**
  - High Speed (> 1Mbps in at least the downlink direction)
    - Wifi, 1XEV-DO, HSPA (HSDPA/HSUPA)
  - Medium Speed
    - GPRS, EDGE, Evolved EDGE, Bluetooth (BT)
  - Slow Speed
    - Zigbee, NFC
Wireless technology categories (cont’d)

- **Power**
  - More power = shorter battery life
  - More power = longer range (in general)

- **Digital Modulation Schemes**
  - PSK – finite number of phases
  - FSK – finite number of frequencies
  - ASK – finite number of amplitudes
  - QAM – finite number of at least two phases and at least two amplitudes
Wireless technology trade-offs

● **Data rate**
  ● Higher order modulation (e.g. 64-QAM vs. 16-QAM) generally provides higher data rates but poorer noise performance resulting in less range

● **Battery life**
  ● Certain modulation schemes generally require linear amplifiers (QAM, OFDM) vs. lower power class C amplifiers that can be used in schemes such as FSK, PSK and CDMA

● **Receiver Complexity**
  ● Certain modulation schemes require coherent demodulation which requires perfect phase and frequency synchronization with the carrier
Multimodal handset

- Combined technologies used to deploy new sets of features and services
  - High Speed Cellular Data Networks (1xEV-DO, EDGE, Evolved EDGE, HSDPA, HSUPA)
  - Wifi
  - Bluetooth
  - Zigbee
  - GPS
  - Others
Multimodality at home
Home media network
Home remote control

- Control Home media server via Handset
  - IP based TV sets get controlled via Wifi from cell phone to media server
  - Stream content from Media Server to local TV monitors controlled via an app running on the Handset
  - Music choices selected via Handset as well as volume control and routing etc.
- Page others over home TV network
- Send PiP of something interesting that is being watched
Paging mode example on home media network
Current issues

- TV manufacturers are working on proprietary RF and Control Protocols
  - This will force all of the components of the system to be the same brand
- They are pushing their own proprietary Remotes to control the system
- Industry needs to push hard for Open Standards for the Interfaces to home media devices
Example of home security mode

- Detecting the presence of a visitor using the visitor door monitor
- Communicating information received at the visitor monitor in association with the visitor detected to a remotely located communication network gateway (home hub) over a short range wireless link
- Communicating the presence of the visitor from the home hub to a remote mobile device and forwarding the corresponding information from the home hub to a remote mobile device over a short range wireless link
- Establishing communication between a remote mobile device and a visitor monitor over a short range wireless link

Source: Patent US 7,304,572
Multimodality at work
Support of multiple modes

- Conference room projector
- Your laptop
- Office printer
- Office access point
- Dedicated storage space and services
- Internet

Your laptop

Office printer

Conference room projector

Office access point

Internet

Dedicated storage space and services
Why is a switch necessary?

• User preferences based on the current task
• Context change and context awareness
• Employment of suitable User Interface technologies
• Minimizing the charges including the roaming charges
• Maximizing the battery life
• Minimizing the time for multiple tasks execution
Multimodality and seamless switching

• The switching among the technologies and modes can be performed implicitly or explicitly

• For implicit switching (passive modalities), the user may or may not be notified about the technology and/or mode change
  • Example: The device automatically switches from WAN to WLAN when the user enters the office

• For explicit switching (active modalities), the user’s intervention and input are required
  • Example: The user forces the mobile device to switch to WLAN from WAN when the WLAN access point becomes available
Multimodal device configuration

Out of band configuration

1. Configuration initialization
2. Reduction of the configuration parameters (optional)
3. Setup out of band channel (e.g. NFC)
4. Configuration data exchange
5. Bluetooth or/and WLAN setting selection
6. WLAN or/and Bluetooth connection setup

The device-inviter “touches” the device-invitee to pass its Bluetooth or/and WLAN settings

Source: www.ip.com IPCOM000175673D
Increasing productivity: multitasking

- Sending an SMS from the mobile device while being on the call
- Sending an email from the smart phone while being on the call
- Browsing the Internet on the mobile device, sending an email and maintaining the phone call simultaneously
Example of context awareness mode

- Choose the closest printer based on the beacons’ RSSI
- Use WLAN to send the document for printing
- Indoor location e.g., based on Zigbee triangulation
Multimodality on the go
Remote home automation – Mode 1

- Security – turn on lights prior to arriving at home
Remote home automation – Mode 2

- Security – Package Delivery
  - Remotely disable alarm, raise garage door, allow package delivery all while watching remotely via security cameras
Accessing home media remotely

- **Media server at home**
  - Contains users video and music content

- **On the go user selects content from home media server**
  - Streams music to listen to in the car via high speed cellular access to handset which sends via Bluetooth to car stereo system or by simple audio cable
  - In the hotel room, via Wifi user selects video to watch from home media server and watches via handset, laptop or even hotel TV via cables
Some points to take away
1. Consider Multimodality as a concept that allows mobile device users to seamlessly switch among different mobile technologies as well as modes of interaction based on the context, certain criteria and constraints.
2. Match the multimodality of devices to the multimodality of our lives
3. The wireless technologies should be harmonized with input/output modes
3. Switch depending on the task

Audio

Speech

Visual

Haptics

Cellular

Other

Wifi

Other

Bluetooth

NFC
4. The APIs should be developed to harmonize the wireless device capabilities and input/output modes
5. The creativity is boundless

The newest BlackBerry Storm handset uses a radically different touchscreen keyboard

To confirm a selection or menu choice, you press harder. The slight flexing of the display triggers a tiny switch beneath it, generating distinct tactile feedback. This avoids a common problem on touchscreens: It can be difficult to distinguish between just moving around the display and initiating an action.

• The Storm uses a touchscreen similar to the iPhone's, where you move your finger lightly on the surface to navigate around the screen.

• The Storm does let you edit by cutting and pasting—and you can use a two-finger stretch to select text.

• You can also use a flick of a finger to scroll pages up or down, which is particularly handy for browsing quickly through a list of e-mails.

http://www.businessweek.com/magazine/content/08_42/b4104000262138.htm?campaign_id=yhoo
6. Explore the new opportunities

Olfaction

Taste

😊
Thank you!