

# Innovating, Integrating, and Improving the Next Generation of Mobile and Multimedia Devices

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**Texas Instruments**



# Agenda

**What We Do**

**Trends in Smartphone Market and Mobile Software**

**Challenges for Linux in Mobile**

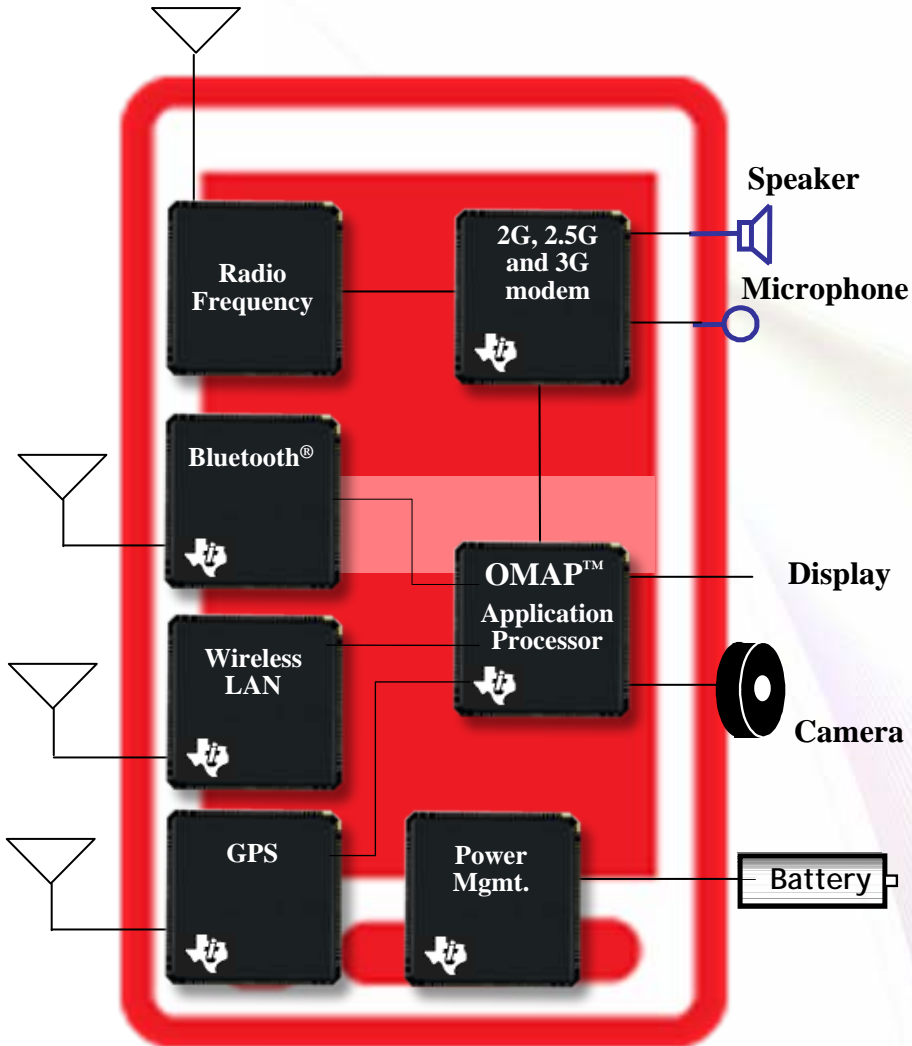
**Enabling the Developer Community**

# Texas Instruments and Linux



# Texas Instruments wireless overview

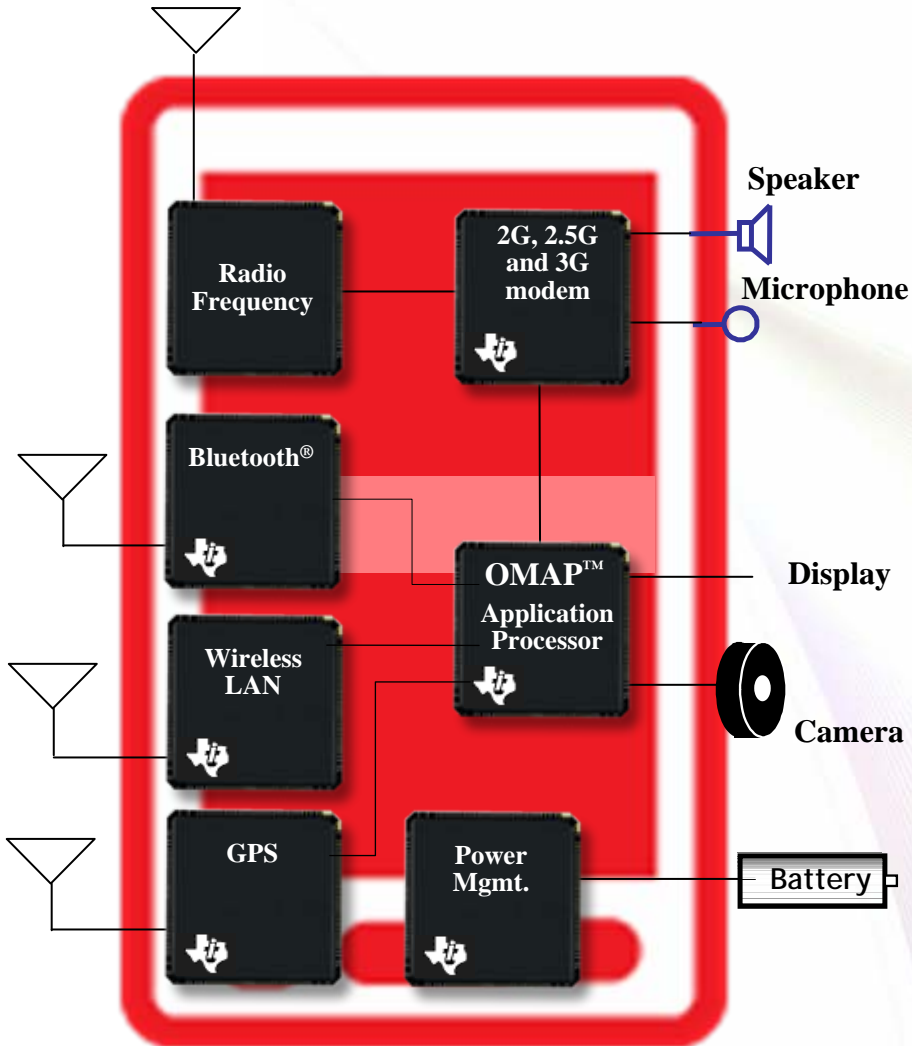
TI delivers broad product portfolio



We build chipsets and provide system solutions that enable device manufacturers to build mobile phones.

# Texas Instruments wireless overview

TI delivers broad product portfolio



## Proven and widely adopted technology

- **18+** years wireless experience
- **OMAP** is the market leading application processor –
  - 3<sup>rd</sup> generation technology shipping today
  - Hundreds of millions of units sold
- **5 of top 5** OEMs chose TI *Bluetooth*®
- **#1 WLAN** technology in cellular market

**NOKIA**  
CONNECTING PEOPLE

**SHARP**



Sony Ericsson



**LG**

**FUJITSU**

**NEC**

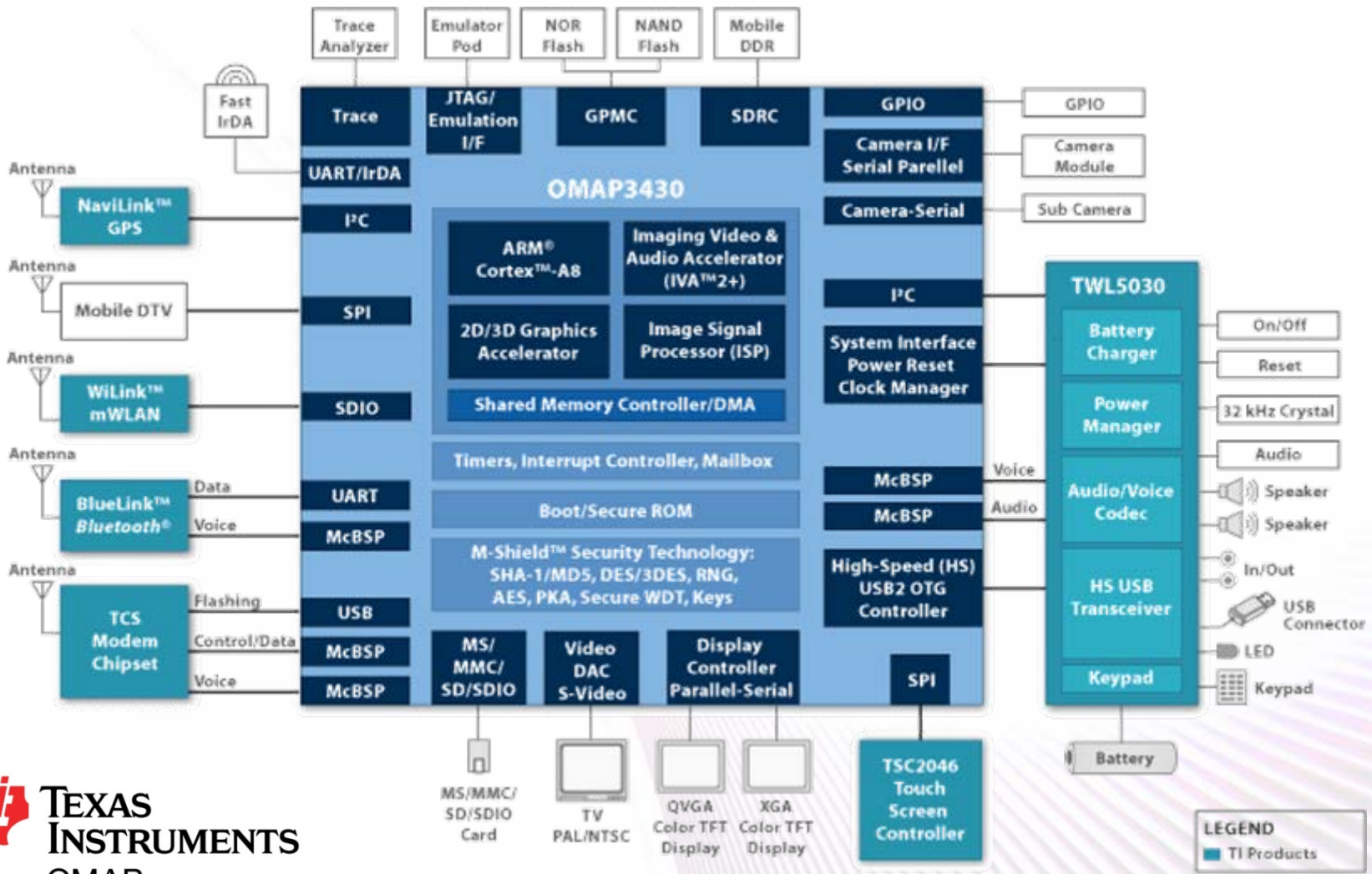


**MOTOROLA**  
intelligence everywhere™

**SAMSUNG**



# OMAP system-on-chip architecture



# Texas Instruments and Linux in Mobile

- TI has delivered OMAP™ platform-based Linux solutions Since 2001
- More than 15 million Linux smartphone & mobile products are enabled by TI OMAP processors
- TI offers open source BSP & multimedia solutions and collaborates with Linux OS vendors to provide commercial Linux products

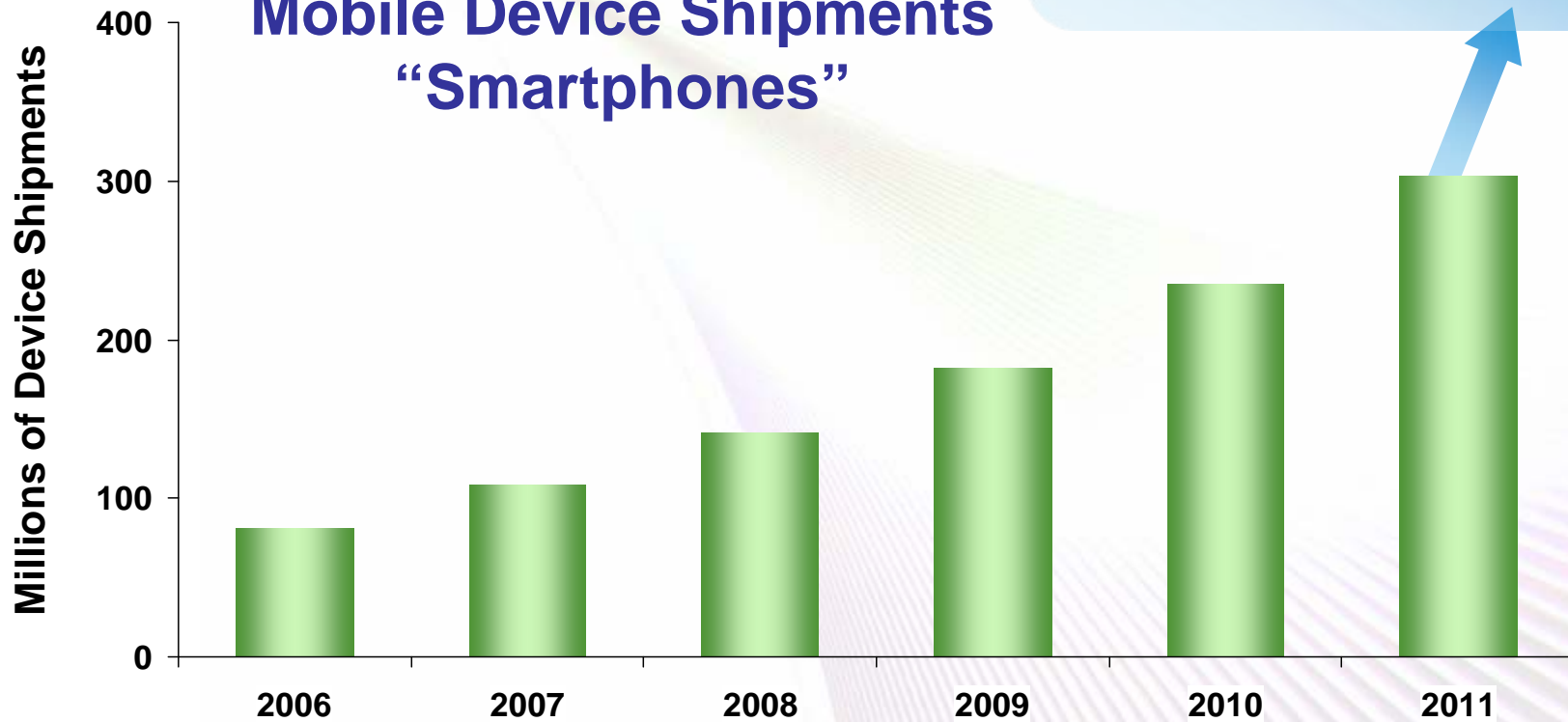
# Trends affecting Linux in Mobile and Multimedia Devices





# Smartphones see strong market growth

## Worldwide Converged Mobile Device Shipments “Smartphones”



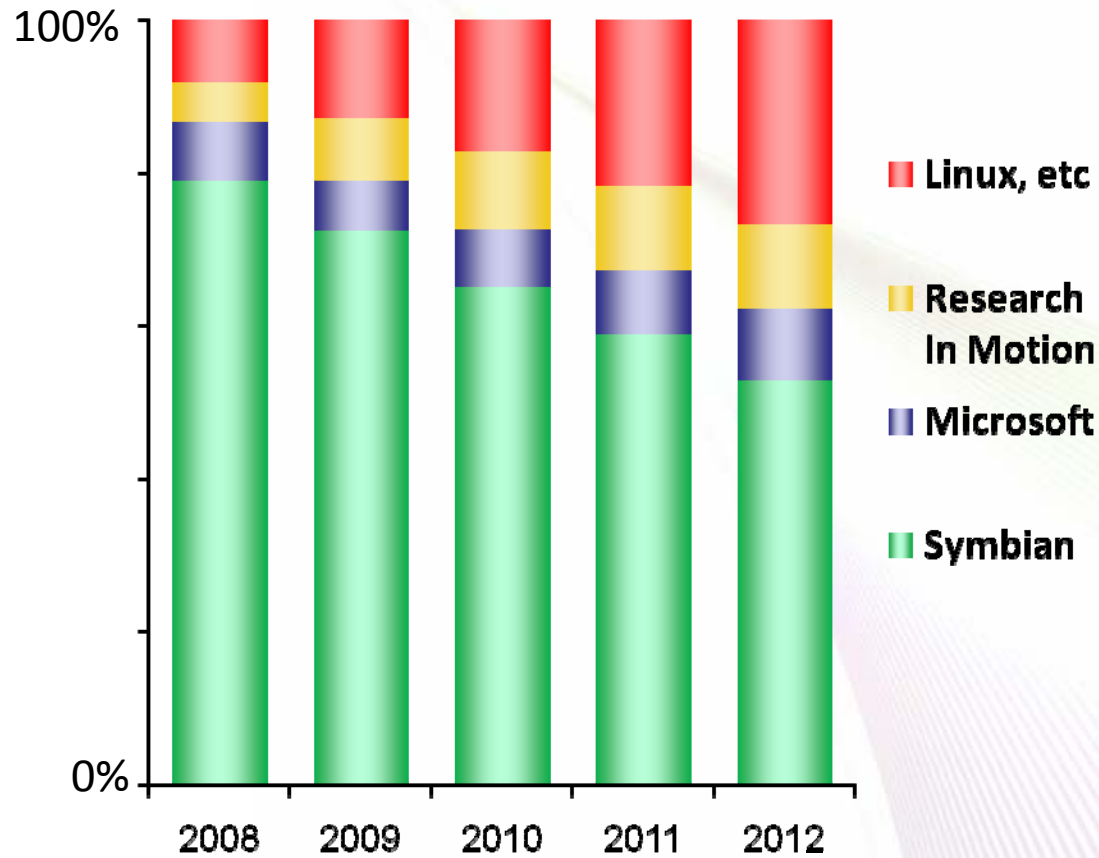
**Smartphones in 2011  
~ 21% of global mobile  
phone shipments**

(Source: IDC, Worldwide Converged Mobile Device  
2007-2011 Forecast Update: June 2007, Doc #207324,  
June 2007)

Source: (IDC, Worldwide Converged Mobile Device 2007-2011 Forecast Update: June 2007, Doc #207324, June 2007)

# Linux in mobile expected to continue growth

Share by Operating System



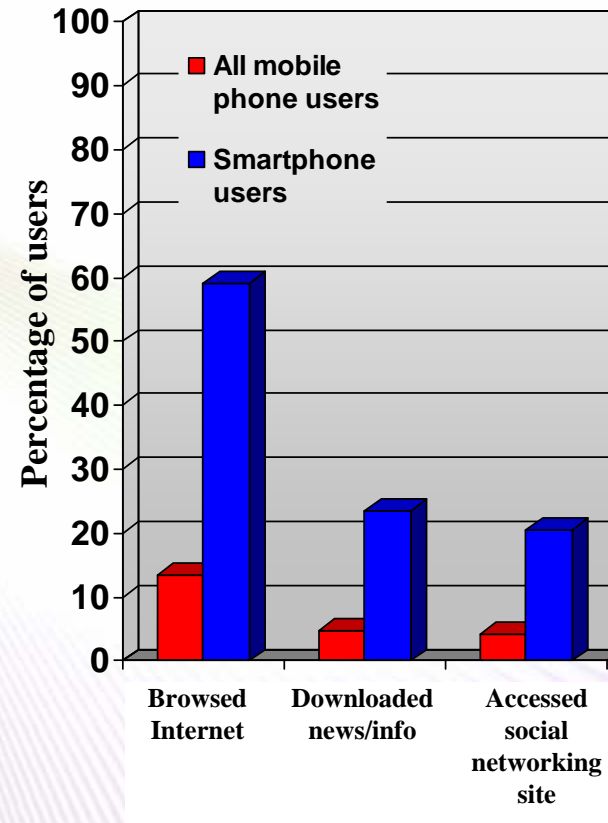
- Expecting growth in both total size of Smartphone market and Linux share

Source: Strategy Analytics, April 2008

# Ease of use drives an increase in consumer usage

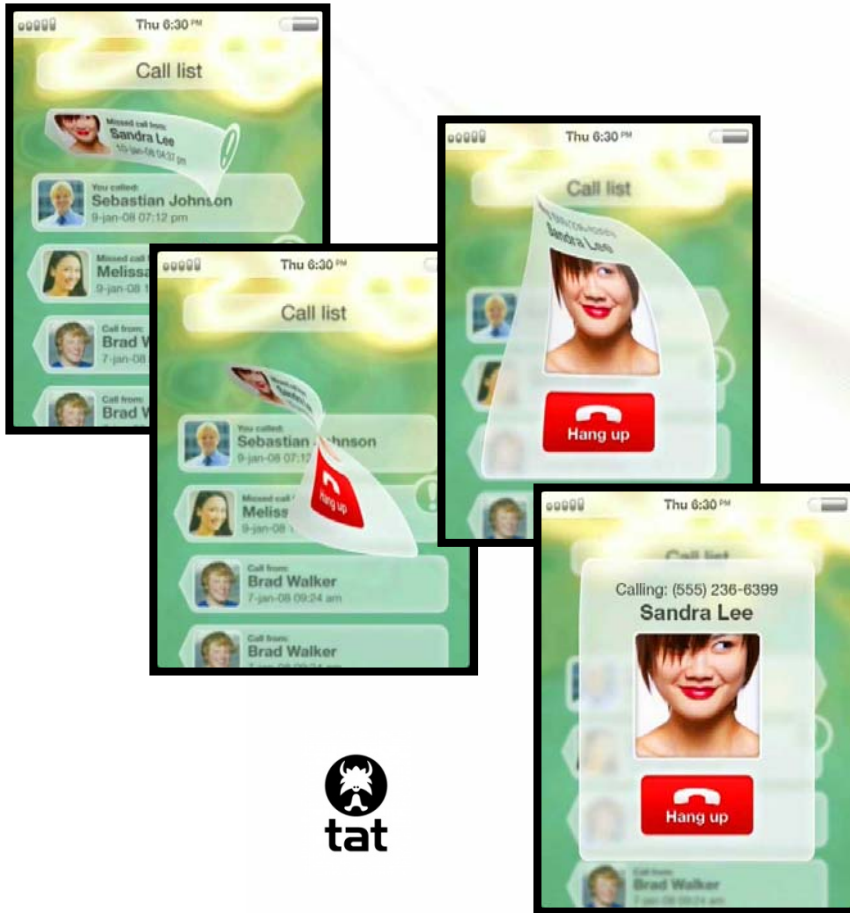


## Intuitive interfaces increase user interaction



Source: M:Metrics, 2008

# Trends in mobile software development



## Handset manufacturers demand complete software solutions

- Reduces software system cost and complexity
- Supports differentiation

## Easy access to hardware acceleration is a requirement

- Multimedia acceleration not just for the high-end – needed across multiple markets

## Collaboration groups creating open software solutions

- Speeds development time when leveraging common platform
- Supports scalability and software reuse, reducing costs
- Standards bodies and foundations

# Khronos® standards ecosystem

The Khronos embedded media acceleration APIs attempt to provide a flexible interface to Hardware Accelerators on mobile and multimedia devices.



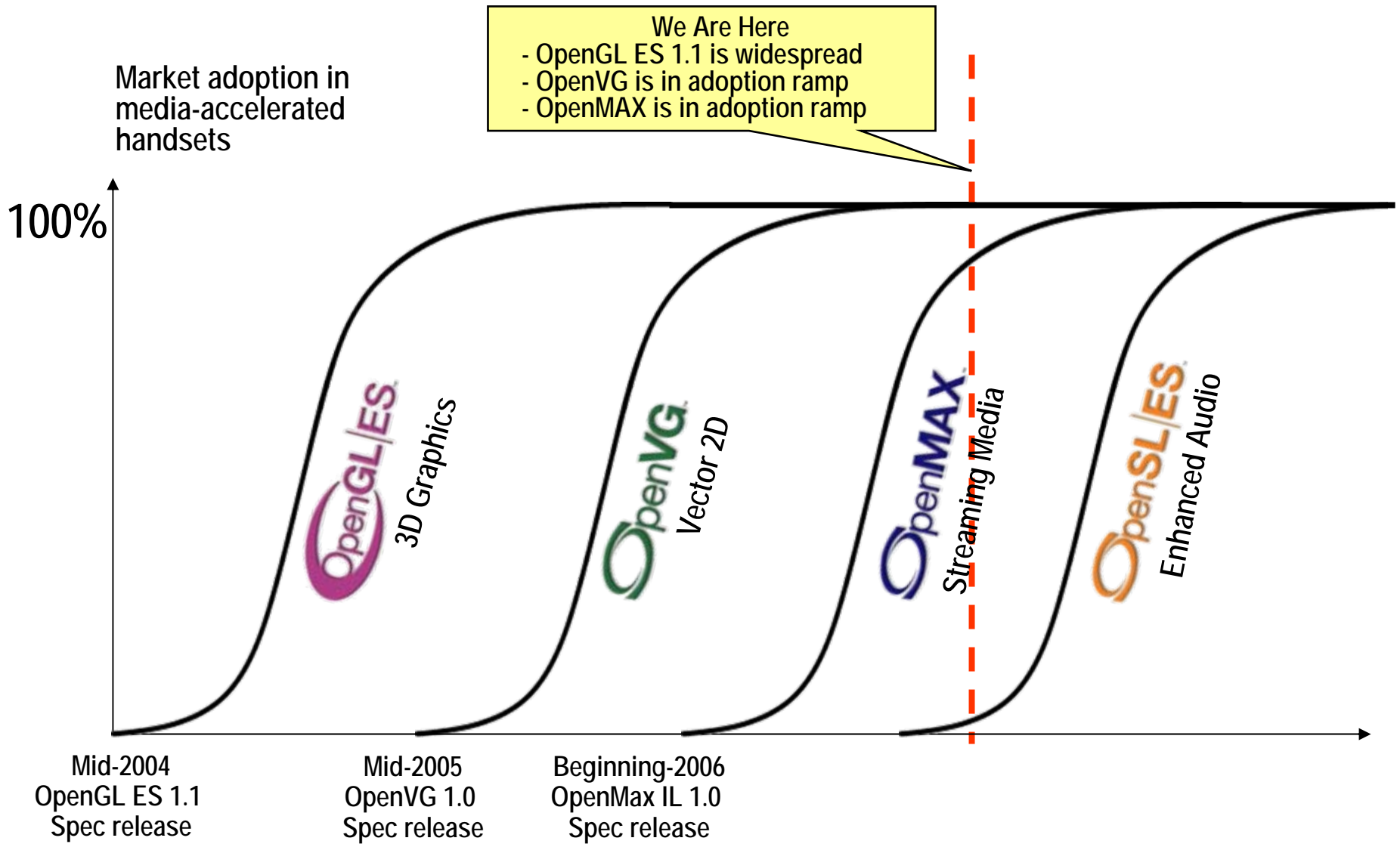
Embedded Media Acceleration APIs

"DirectX-like" set of native APIs  
Includes mixed media acceleration and OS portability APIs

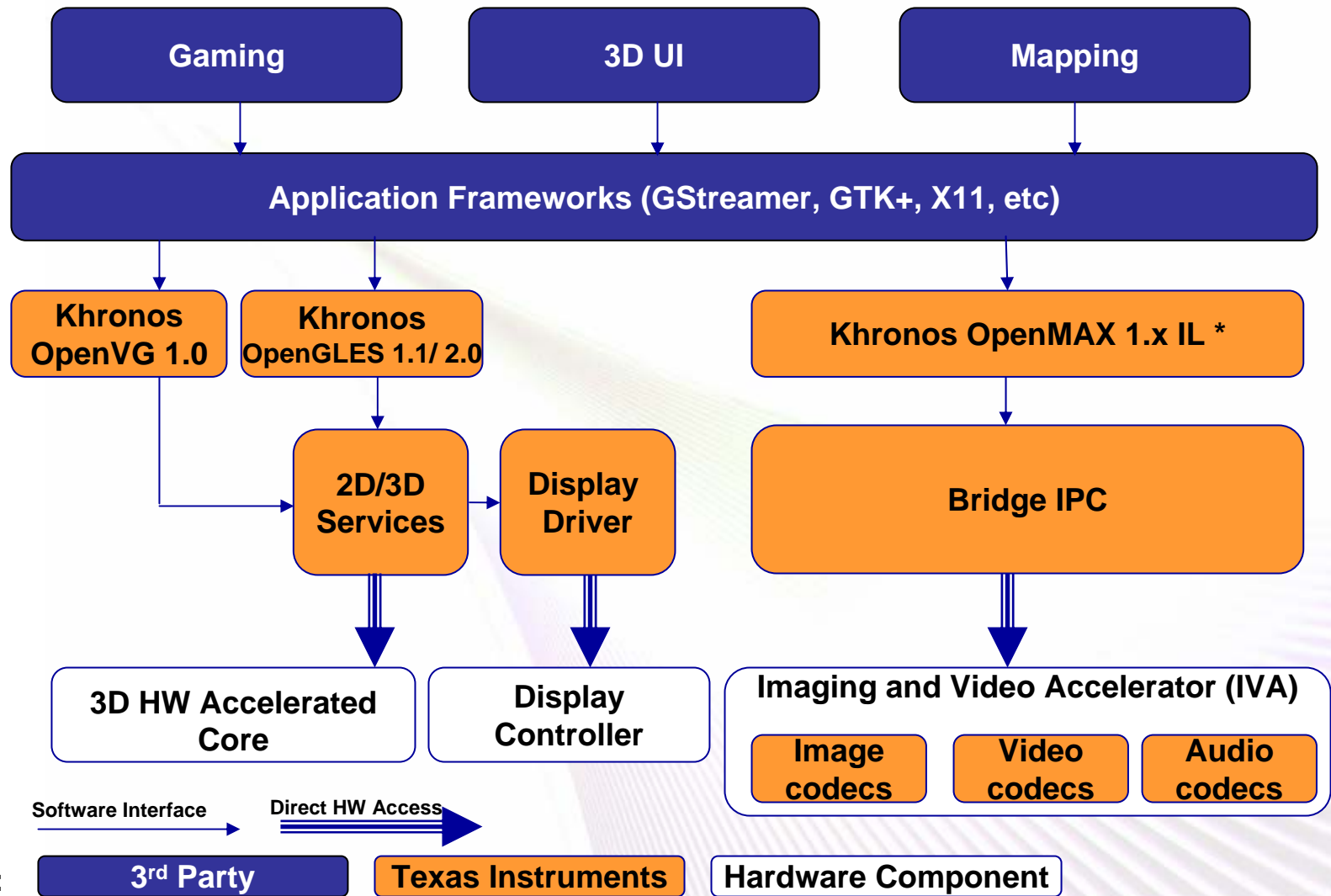




# Adoption of multimedia open standards

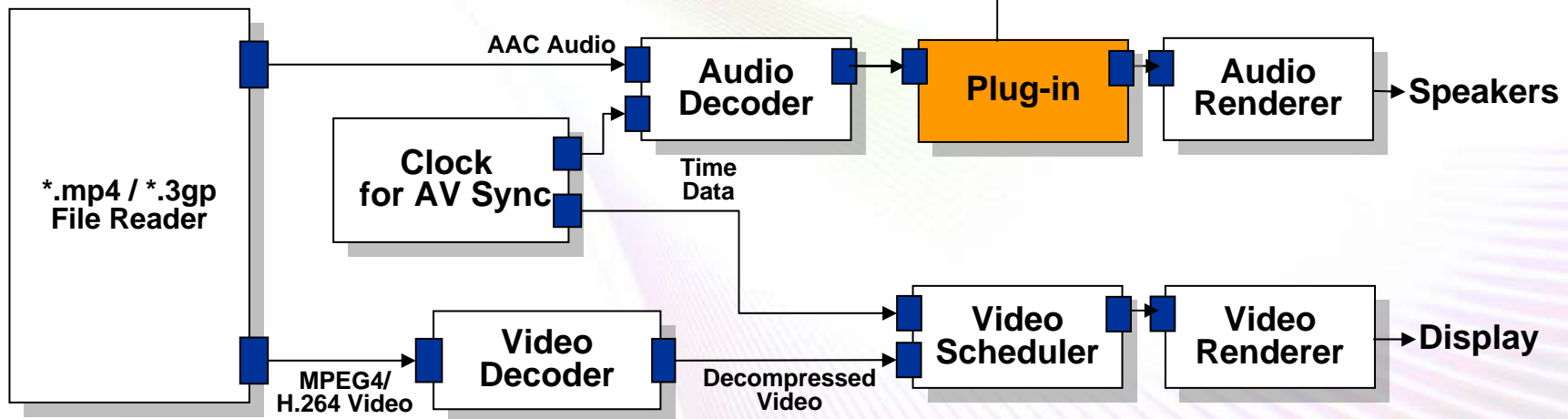


# OMAP™ Platform Software Stack



# OpenMAX IL example graph

- Standardized component interfaces enable flexible media graphs
- Includes multi-stream synchronization
- Allows for custom plug-ins



Example: MPEG-4 video synchronized with AAC audio decode

# Some challenges for Linux in mobile

- **Difficult to achieve full processor entitlement on production mobile Linux devices**
  - Desktop and Laptop focused software solutions are trailing behind mobile hardware in some key areas
    - Aggressive power management architectures
    - Web cam frameworks are repurposed for digital camera
  - Khronos' open standards are not yet widely supported by existing Linux-based multimedia frameworks
- **True collaborative development is not (yet) wide spread across mobile industry**
- **Must be able to support multiple application suites**
  - Market is large enough for multiple solutions

# Improving access to hardware acceleration



- **Provide developers with a realistic low-cost system for development and validation**
  - Logic PD's Zoom Mobile Development Kit, based on TI's OMAP3430 Processor
- **Make OpenMAX IL and OpenGL® ES libraries available to enable integration and UI innovation**
- **Promote collaboration on new solutions enabled by current-generation mobile hardware**
  - 3D Graphics
  - Multimedia Accelerators
  - Telephony
  - Application UI Integration
  - Camera and Camcorder Applications
  - Gaming Development



# What is available today for the Zoom MDK?

- **OMAP3430 processor technical reference manuals**
- **Zoom MDK and Beagle Board hardware platforms are available through distributors**
- **OpenMAX IL library released under LGPL (v2.1)**
  - An evaluation package for testing MPEG4 H264 and AAC codecs are also available
- **Linux kernel git tree with latest developmental support for OMAP platform**
  - Aggregation of patches we are working to push upstream
  - Enhanced power management
- **Software and more details are on <http://omapzoom.org>**
- **Feedback is welcome for future releases**

# Summary

**Growth of Smartphones is driving need for multimedia rich mobile experiences**

**Additional native support for mobile centric solutions is needed within Linux frameworks**

**TI is openly providing the resources needed to innovate with Linux for mobile**

# THANK YOU!

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