Texas Instruments

Making**Wireless** —
Making**3G**

Ward Pitkin

Manager
Cellular Systems Software Marketing
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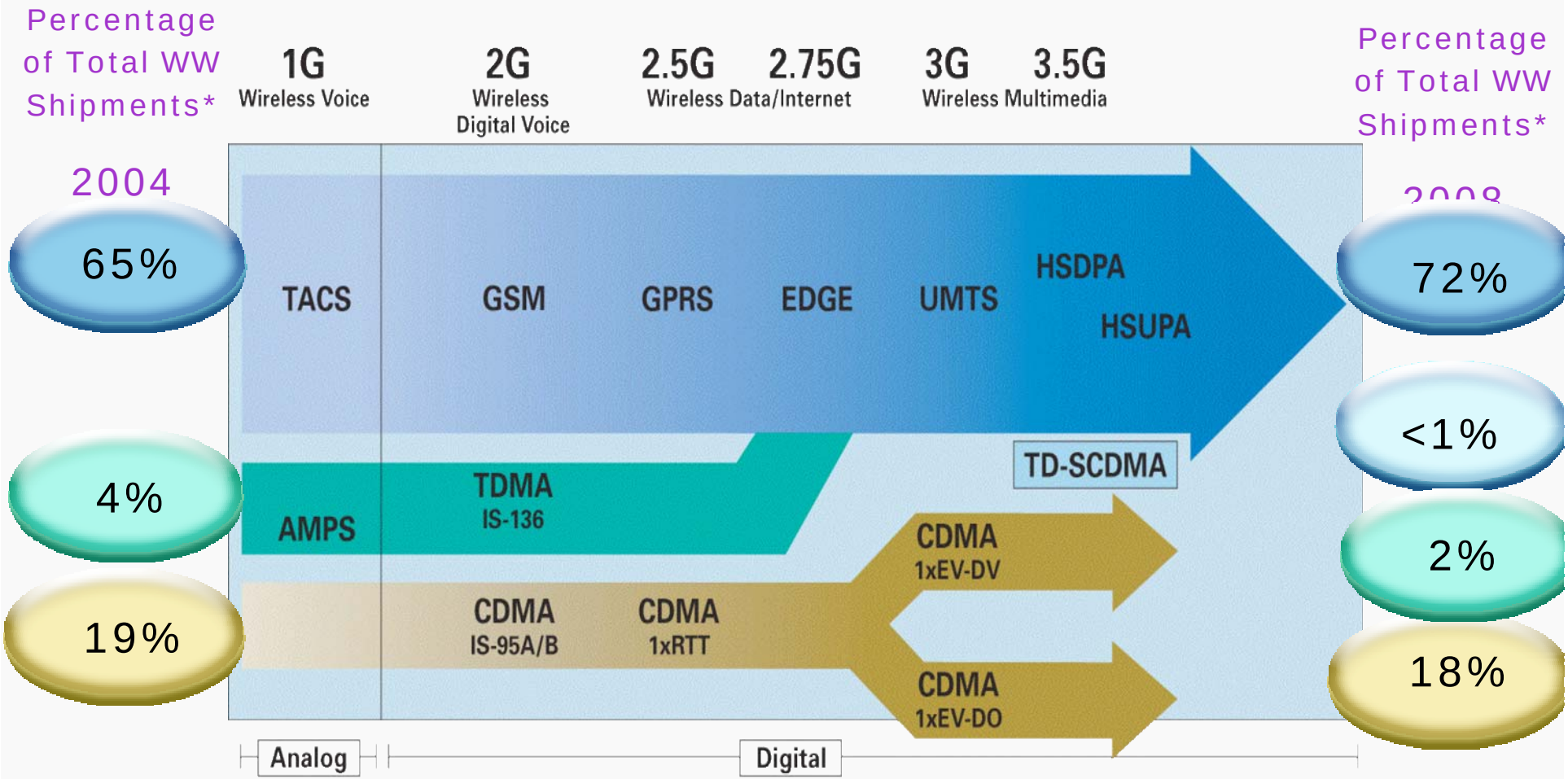
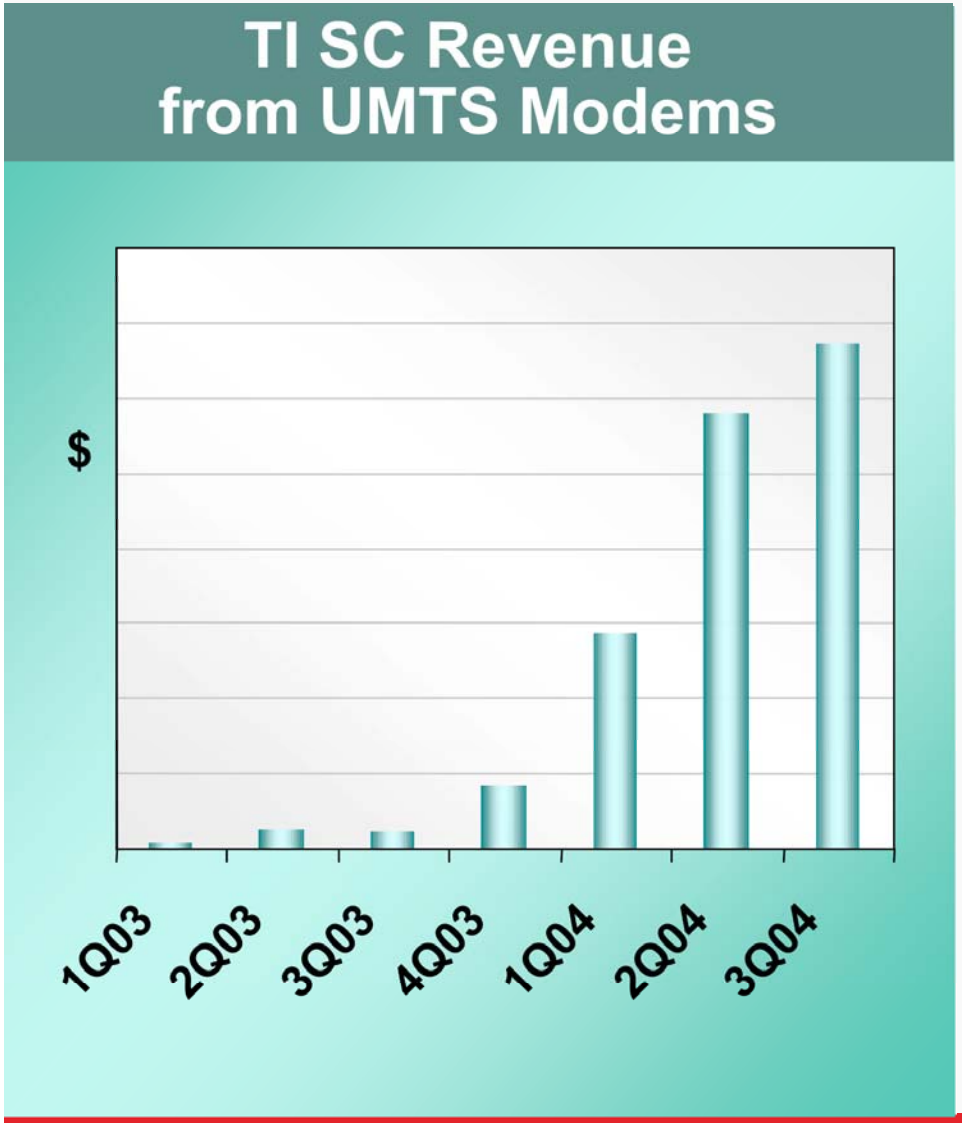
Wireless Standards Evolution



* Source: IDC

TI Leads in 3G



- TI processors power most UMTS handsets shipping in 2004
- 6 of the top 7 worldwide 3G handset manufacturers use TI DSPs for modems, applications, or both
- 5 of 5 3G FOMA manufacturers use TI OMAP processors in their mobile handsets
- TI/DoCoMo joint development for integrated UMTS baseband and apps processor, based on OMAP 2

3G Mobile Handsets Are Complex

Modem Complexity

- 384K data rates
- Interoperability testing; backwards compatibility with legacy standards

Application Complexity

- Applications processing requirements growing by orders of magnitude

More Connectivity

- Potential for up to 5 radios and up to 10 frequencies in one 3G handset

Power Consumption

- 360-480 hours of stand-by time
- Video, TV, games, etc. consume more power and drive more activity on the display

Modem and Applications expertise required

Cool Applications Drive 3G

3G Handsets Available Today

SonyEricsson Z1010
Music DJ

Fujitsu FOMA F900iC
Mobile Wallet

Fujitsu FOMA F900iT
Secure Fingerprint Access

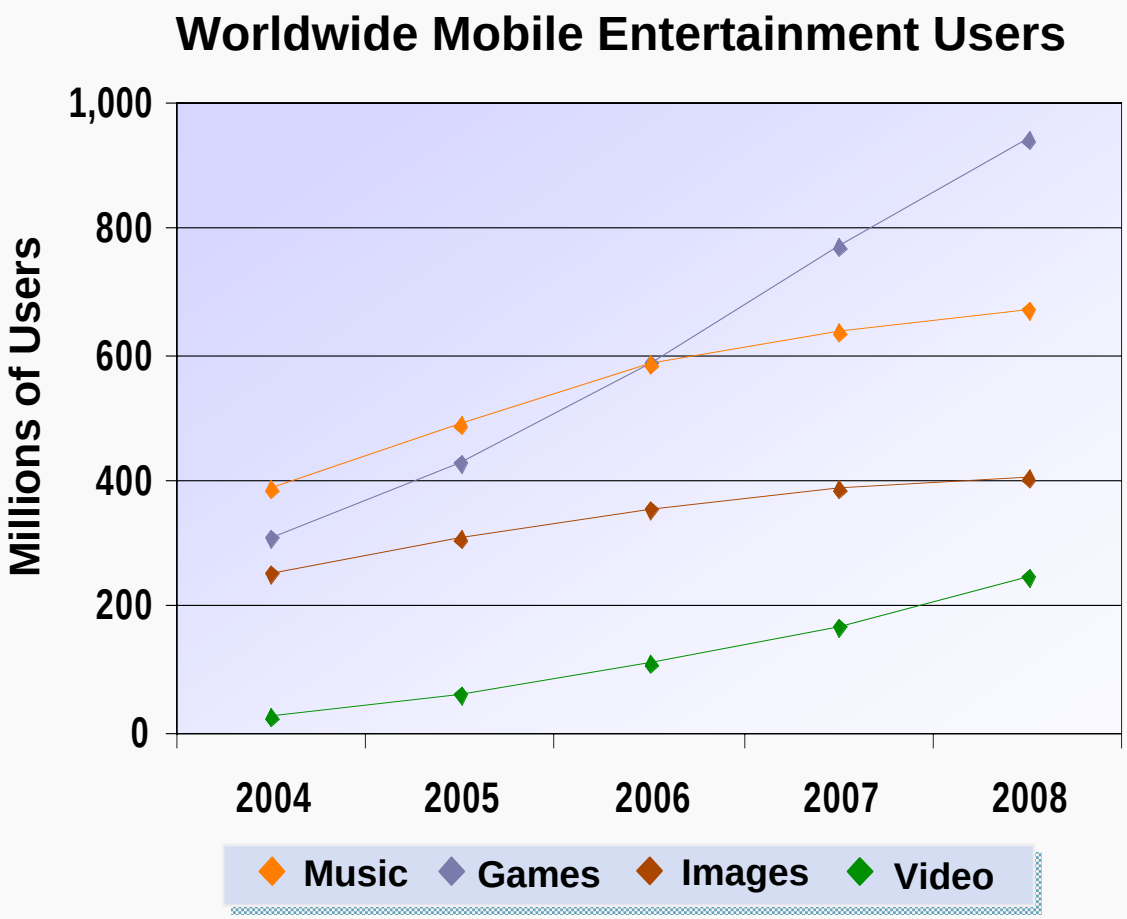
Samsung SPH-v4400
2 Megapixel Imaging with Flash

LG Cyon June SV9140
Live TV

Nokia 7600
Digital Music Player for MP3

Nokia 6630
WCDMA+EDGE broadband access

Mobile Entertainment Taking off – Driving 3G to High Volume

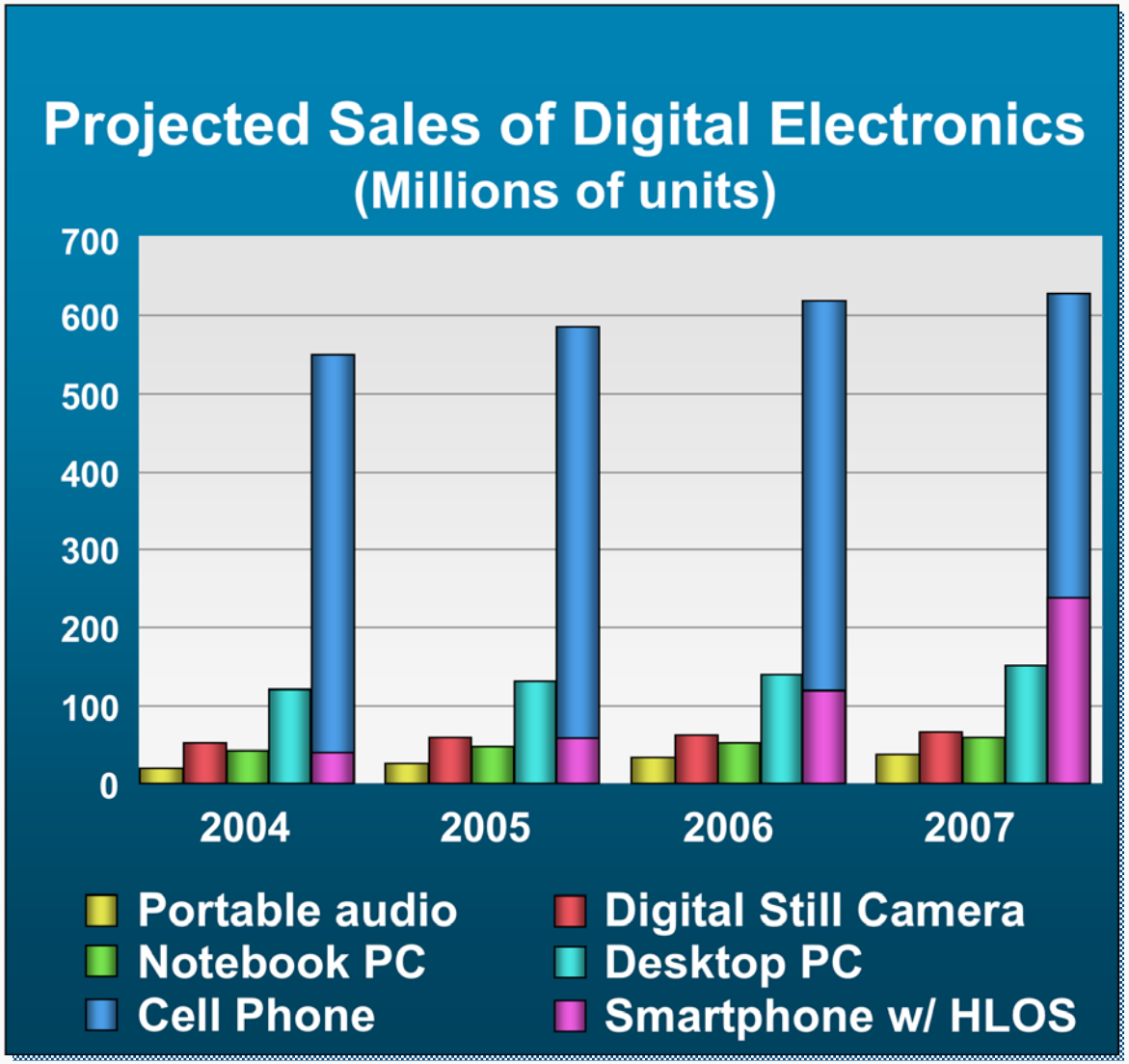


Source:
ARC Group

On 3G Handsets Today…

- Custom Ring Tones
- Digital Music Player for MP3
- 2 Megapixel Imaging with Flash
- 3D Games
- Live TV
- Mobile Wallet
- Secure Fingerprint Access

The Wireless Platform Is the Convergence Point for all Consumer Electronics



More than any other device, people will use cell phones to:

- **Make phone calls**
- **Access the Internet**
- **Take and send pictures**
- **Listen to music**
- **Record and watch video**
- **Organize their lives**
- **Play games**

Source: InStat, iSuppli

Trends in Wireless Multimedia

Functions and Features:

- Display: QVGA ◊ VGA
- Camera: 0.3M pixels ◊ 4M+ pixels
- Video: QCIF ◊ VGA 15 fps ◊ 30 fps
- Storage: 128Mb ◊ 1Gb
- Wider wireless pipe: GPRS ◊ EDGE; UMTS ◊ HSDPA; WLAN
- Silicon: 180 nm ◊ 130 nm ◊ 90 nm ◊ 65 nm

Standards:

- New emerging standards: H.264, JPEG2000
- New standards require much higher processing performance: ~2x to ~10x algorithmic complexity

OMAP™ 2: All-in-One Entertainment Architecture for 3G

Display
CIF, VGA
Up to D1

Audio
Dolby audio and
3D audio effects

Camera
4 megapixel
Up to 6
megapixel

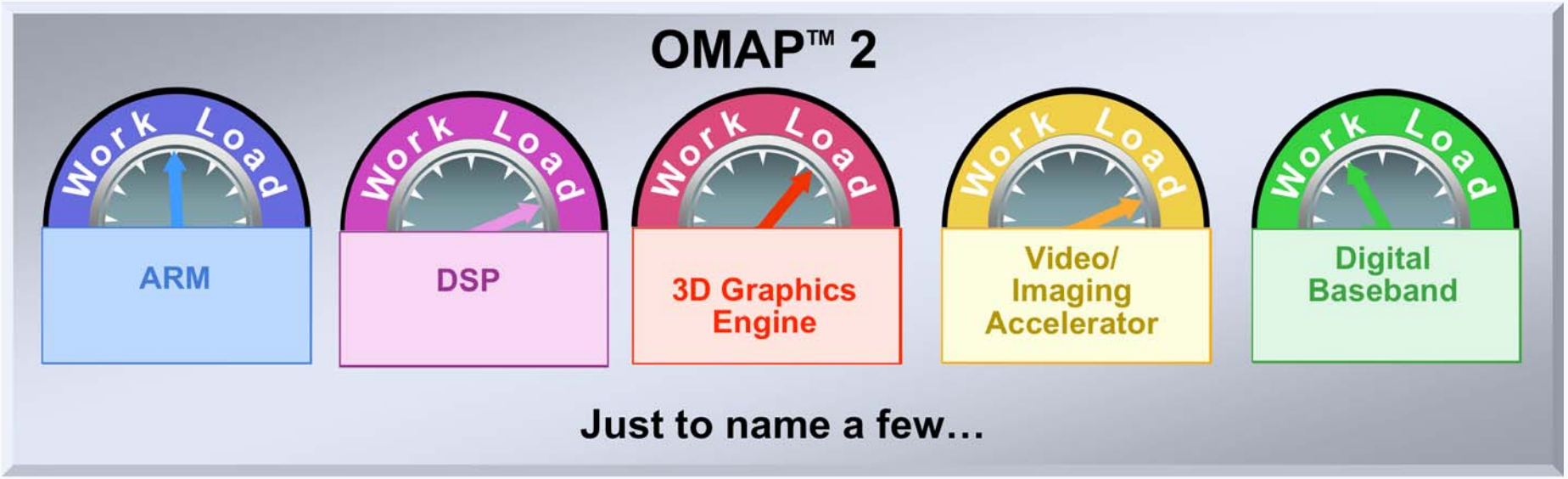
Video
VGA video
Up to DVD
quality

TV
TV output
Digital TV
reception

Games
3D interactive
Game-console
quality soon

OMAP™ 2 Multi-Engine Processor Architecture for Parallel Processing

Multiple Engines Running Multiple Tasks

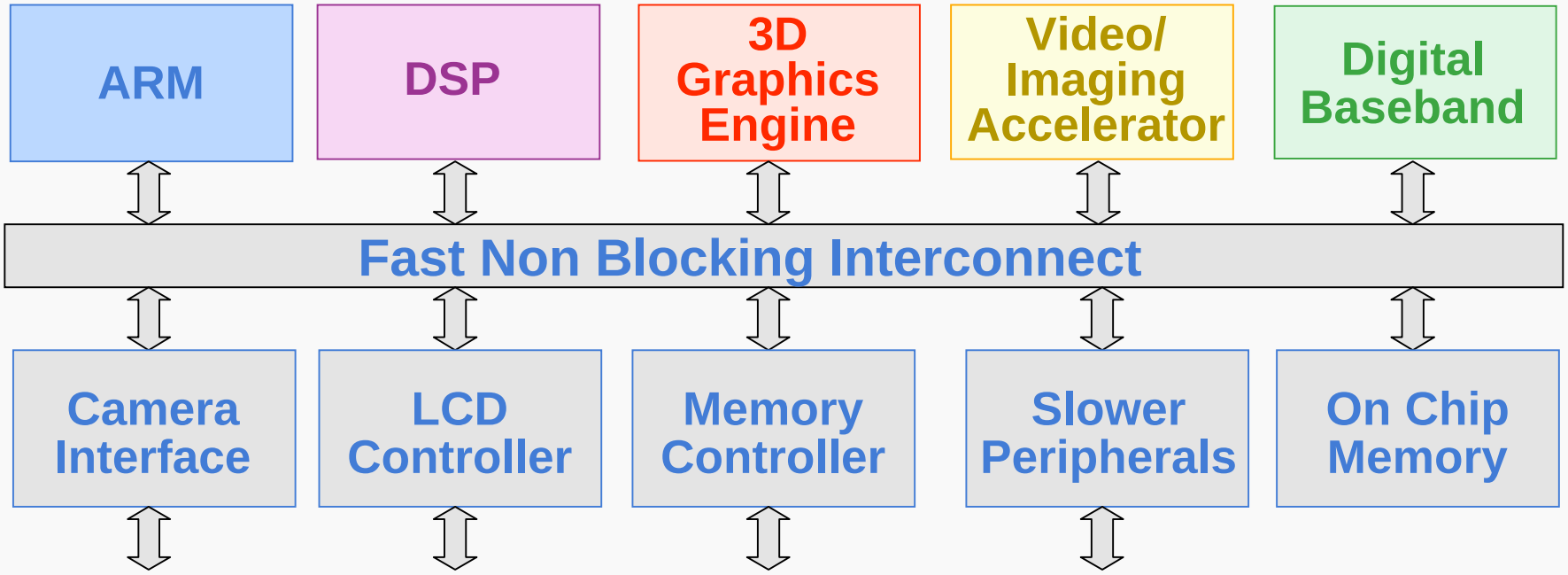


Simultaneous Parallel Processing

- No degradation in quality of service
- Highly responsive
- Flicker-free video and click-free audio during multitasking

Multi-Engine Processor Architecture for Parallel Processing

Multiple Engines Running Multiple Tasks



Simultaneous Parallel Processing

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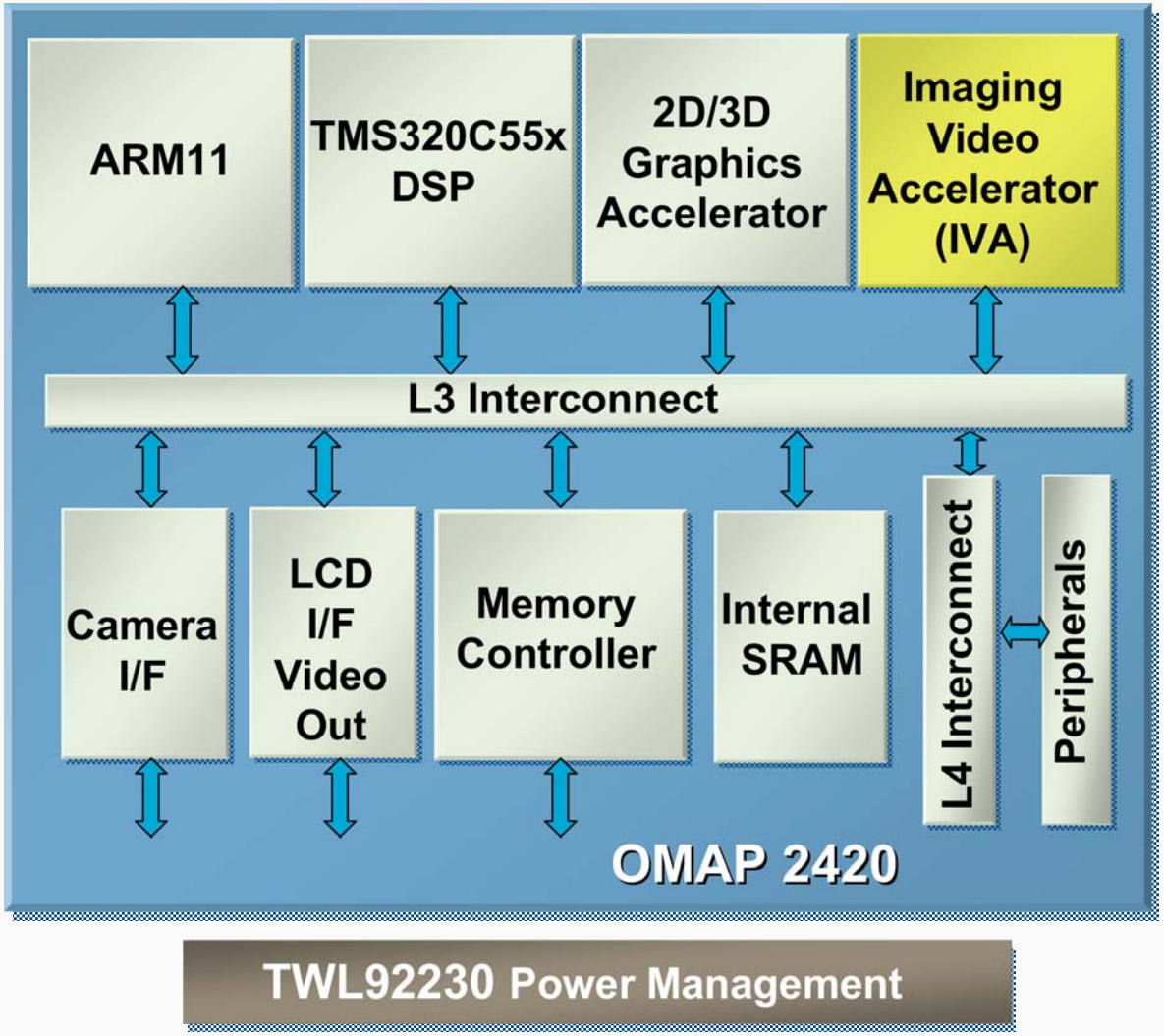
OMAP2420



OMAP2420 Features

- ARM1136 @ 330 MHz, 32/32 KB caches
- DSP @ 220 MHz
- 2D/3D hardware accelerator, up to 2M polygons/sec
- Cross-bar high-speed low-latency interconnect
- IVA: boosts still pictures >4Mpixels, video encode or decode up to VGA 30 fps
- 5Mbit internal SRAM supporting VGA display
- Video out supporting external TV display

A glimpse of the near future….

OMAP™ 2 Architecture Delivers Quantum Leap in Mobile Application Performance

Today

Up to 1 mega pixel camera

Up to 70K polygons per second gaming

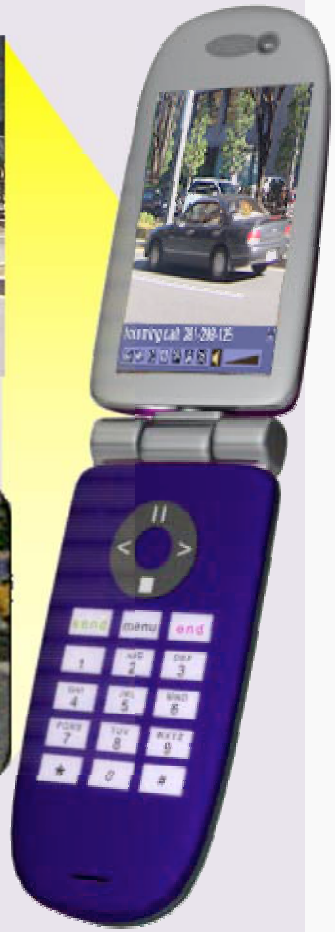
* Courtesy of Fathammer

Tomorrow

4 mega pixels and more camera

Up to 2 million polygons per second for graphics and gaming

* Courtesy of Criterion



OMAP™ 2 Processing power adds the true consumer electronics entertainment experience to mobile phones

Video Stabilization Example

Original

Stabilized

High end video camcorder features coming to mobile phones

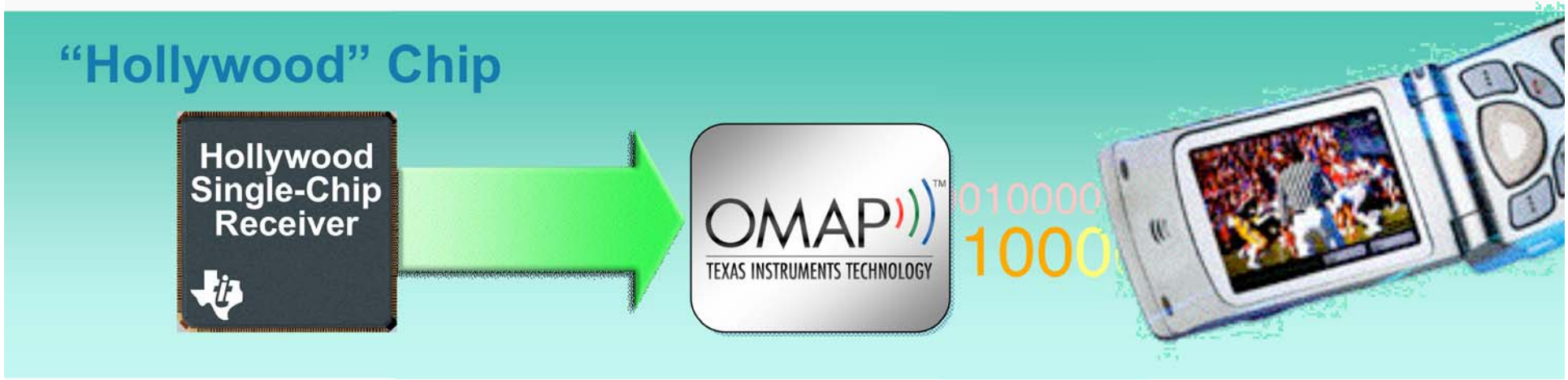
DSP video stabilization software removes camera jitter amid many different motions in the scene without using motion sensors

OMAP™ 2 2420 3D graphics demo

Christmas 05 Games on OMAP2 mobile phones will have *outstanding* performance

Looking ahead a little further…
TI Brings Live Digital TV to Your Cell Phone

Receiver	Image Processor	Display



- Receiver integrates today's 3 chips into one
- Receives & processes TV signals. Outputs MPEG video to an OMAP processor

- Decodes MPEG streams; outputs the image to the screen

- View digital TV broadcasts live: news, sports, entertainment, etc.

Summary

3G and CE drive each other and its happening now

The mobile phone is the convergence platform for the handheld consumer electronics experience

Converging state-of-the-art digital cameras, camcorders, game consoles, and mobile phones is not only possible, it's a reality for this year's designs: OMAP2 !

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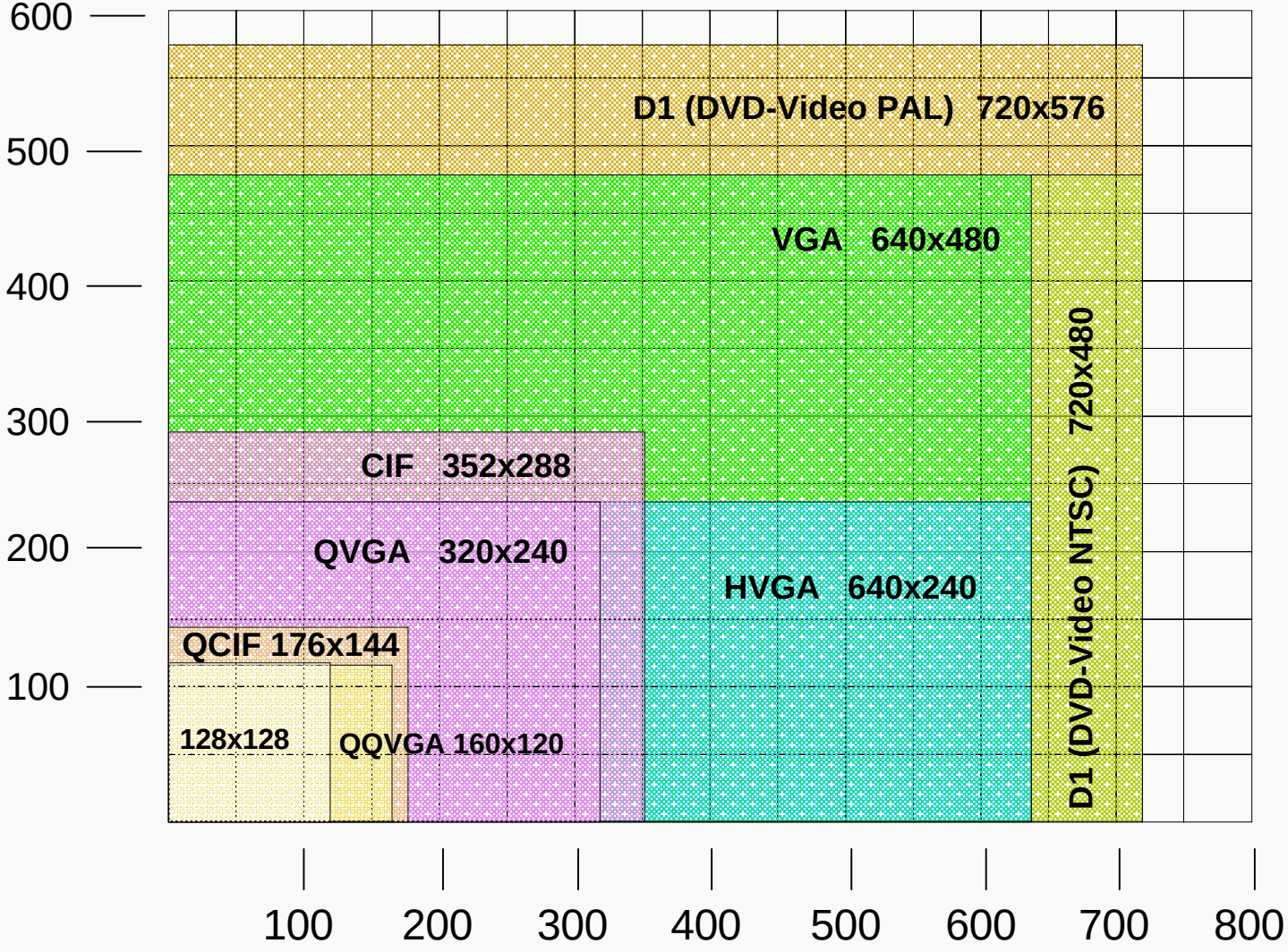
Display Resolutions

QQCIF	88x72
QQVGA	160x120
QCIF	176x144
QVGA	320x240
CIF	352x288
HVGA	640x240
VGA	640x480
D1 (TV NTSC)	704x480
D1 (TV PAL)	704x576
D1 (DVD-Video NTSC)	720x480
D1 (DVD-Video PAL)	720x576

Display Relative Resolutions