

Toshiba's MPEG-4 Solutions

Low-Power, Single-Chip MPEG-4 CODEC

....Enabling Wireless Multimedia

Agenda

- **Overview of MPEG-4 standard**
- **Overview of Toshiba's MPEG-4 solutions**
- **Emerging MPEG-4 Applications**
- **MPEG-4 Roadmap**

What is MPEG-4?

A Comparison of video standards

	ENTERTAINMENT		TOSHIBA	COMMUNICATIONS	
	MPEG-1	MPEG-2	MPEG-4	H.263	H.261
Primary application	CD-ROM	DVD, HDTV, Broadcast	Portable multi-media	Desktop video conference	Wireline video conference
Video datarate's	1.5Mbps	4.6Mbps	20Kbps-6Mbps	20-384Kbps	128-384Kbps
Typical video frame size	352x240	720x480	176x144(QCIF) 352x288(CIF)	176x144(QCIF) 352x288(CIF)	176x144(QCIF) 352x288(CIF)
Typical audio quality	Stereo CD	Surround sound	Speech, stereo CD, surround sound	Speech	Speech
Error resilience	Basic	Basic	Advanced	Adequate	Basic

Toshiba's MPEG-4 Activity

- **Leader in MPEG technology standardization**

 - ISO: Significant contributor to ISO MPEG-4 standard**

 - ITU: H.223 Annex-D, Currently working for H.323Mobile**

 - 3G-PP: Leading Activity on 3G-324M which includes MPEG-4**

 - IETF: MPEG-4/IP Standardization Activities**

- **Complete suite of MPEG-4 solutions**

 - Single-Chip, Low-Power MPEG-4 Decoder**

 - Software MPEG-4 Decoder**

 - Single-Chip, Low-Power MPEG-4 CODEC**

 - Firmware IP for MPEG-4 CODEC (Video/Audio/Comm)**

 - Middleware IP (Driver/Video telephony, etc)**

 - Reference Boards for Prototype Design**

Low-Power, Single-Chip Decoder

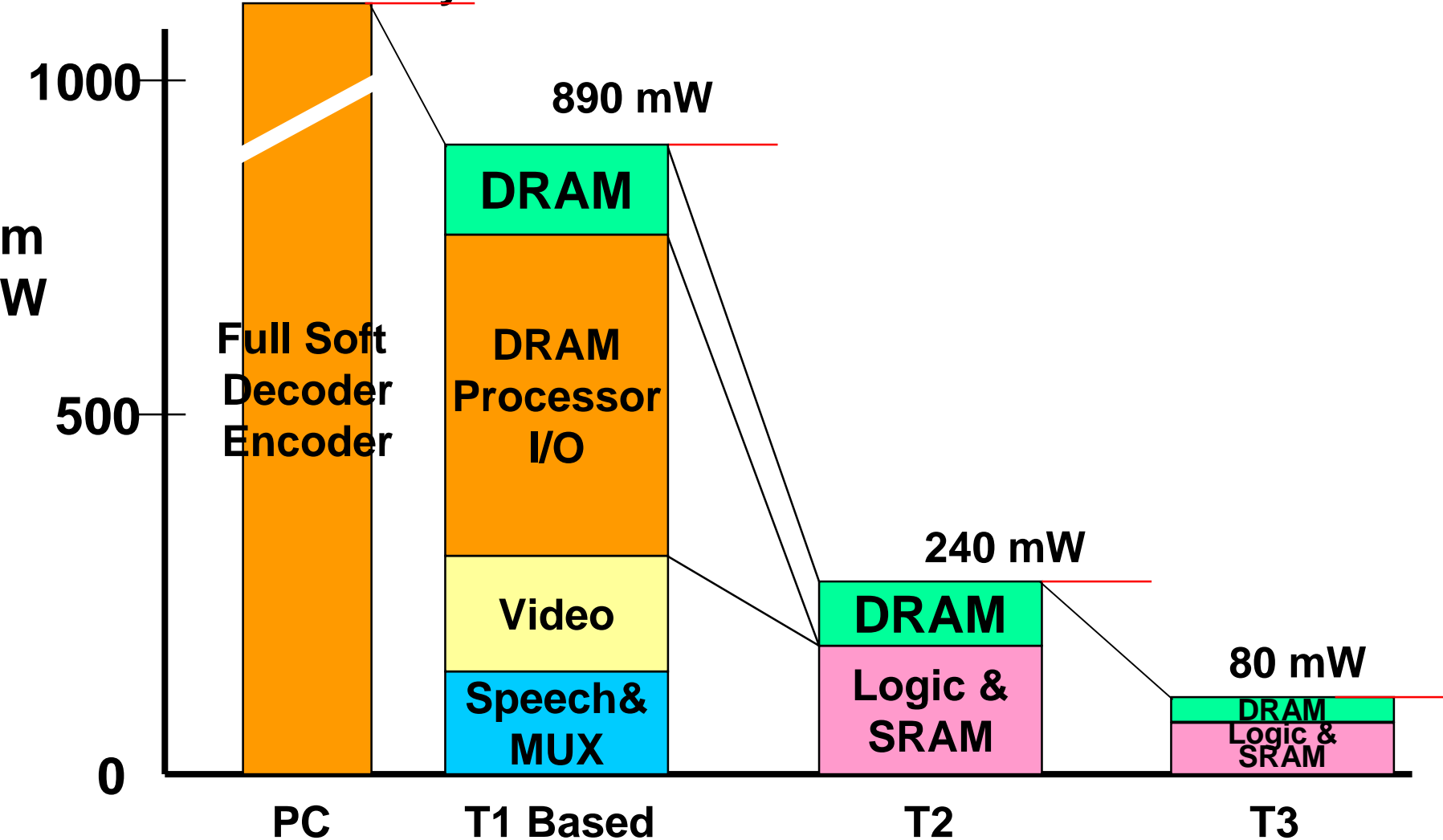
- **First to market with production silicon**
- **Leveraged expertise in embedded DRAM technology to enable low-power dissipation**
 - Reduced power dissipation to 50mW
- **4Mb of embedded DRAM**
- **Video decode of 15 fps at QCIF (176x144 pixel)**
- **30MHz clock frequency**
- **Fully compliant with MPEG-4 standard**

Low-Power, Single-Chip CODEC

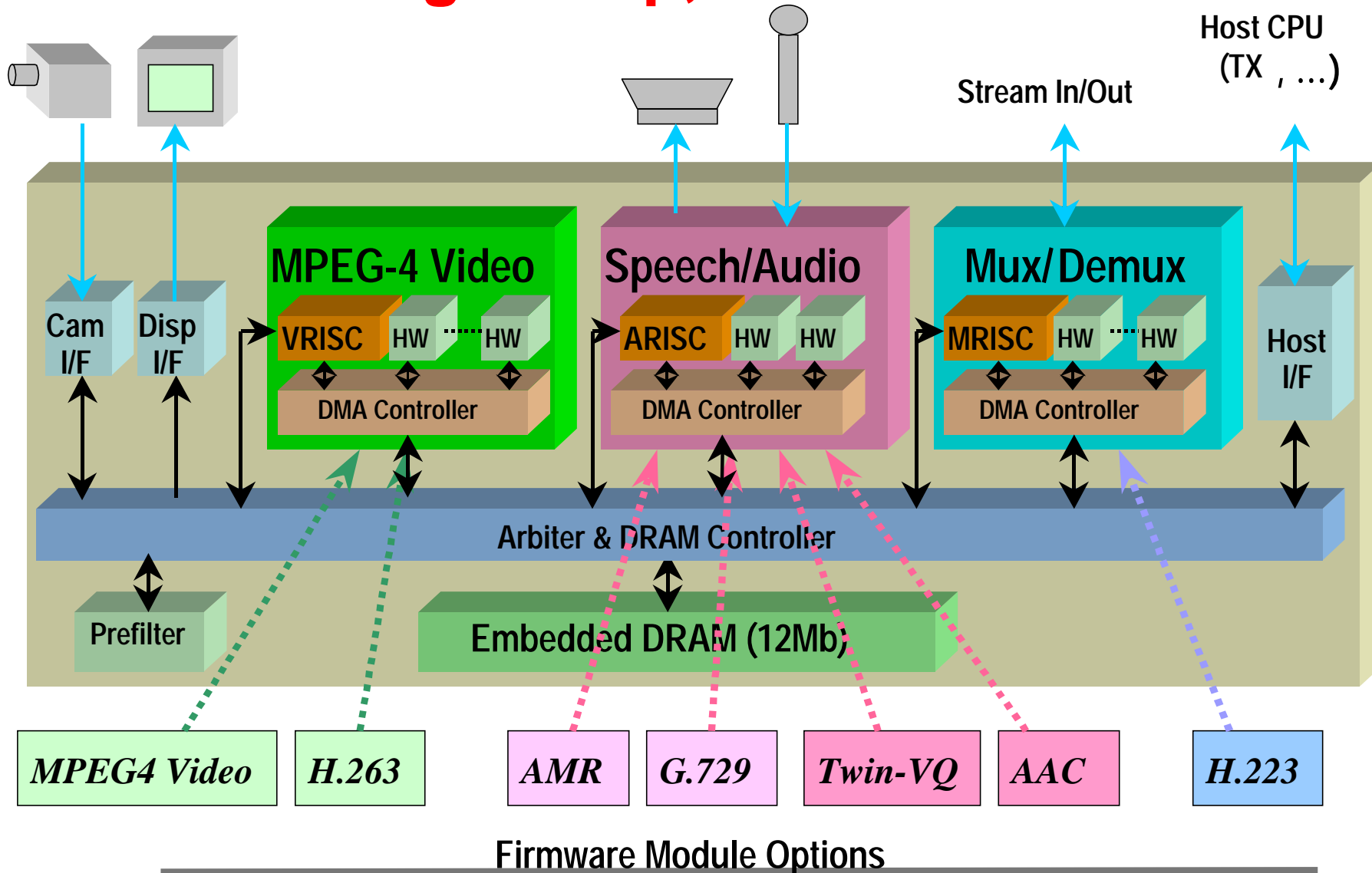
- **Again, integrated embedded DRAM for low-power dissipation**
 - Reduced power dissipation to 80mW
- **12Mb of embedded DRAM**
- **Video decode of 15 fps at QCIF (176x144 pixel)**
- **Adaptive Multi Rate Speech CODEC**
- **70MHz clock frequency**
- **Fully compliant with MPEG-4 standard**

Power Consumption Comparison

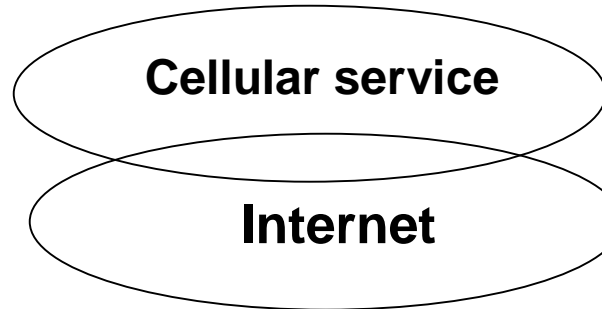
Over 1.5W by PC CPU



MPEG-4 Single-Chip, Low-Power CODEC



What's MPEG-4 Visual Telephony ?



"You have to see it for yourself..."

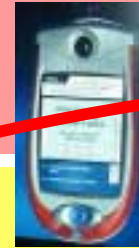
Toshiba's view on classes of phones

Feature Phone



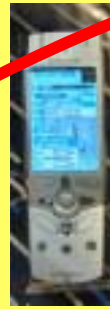
Visual Oriented Models

Software decoder



Hardware decoder

Voice Oriented Models



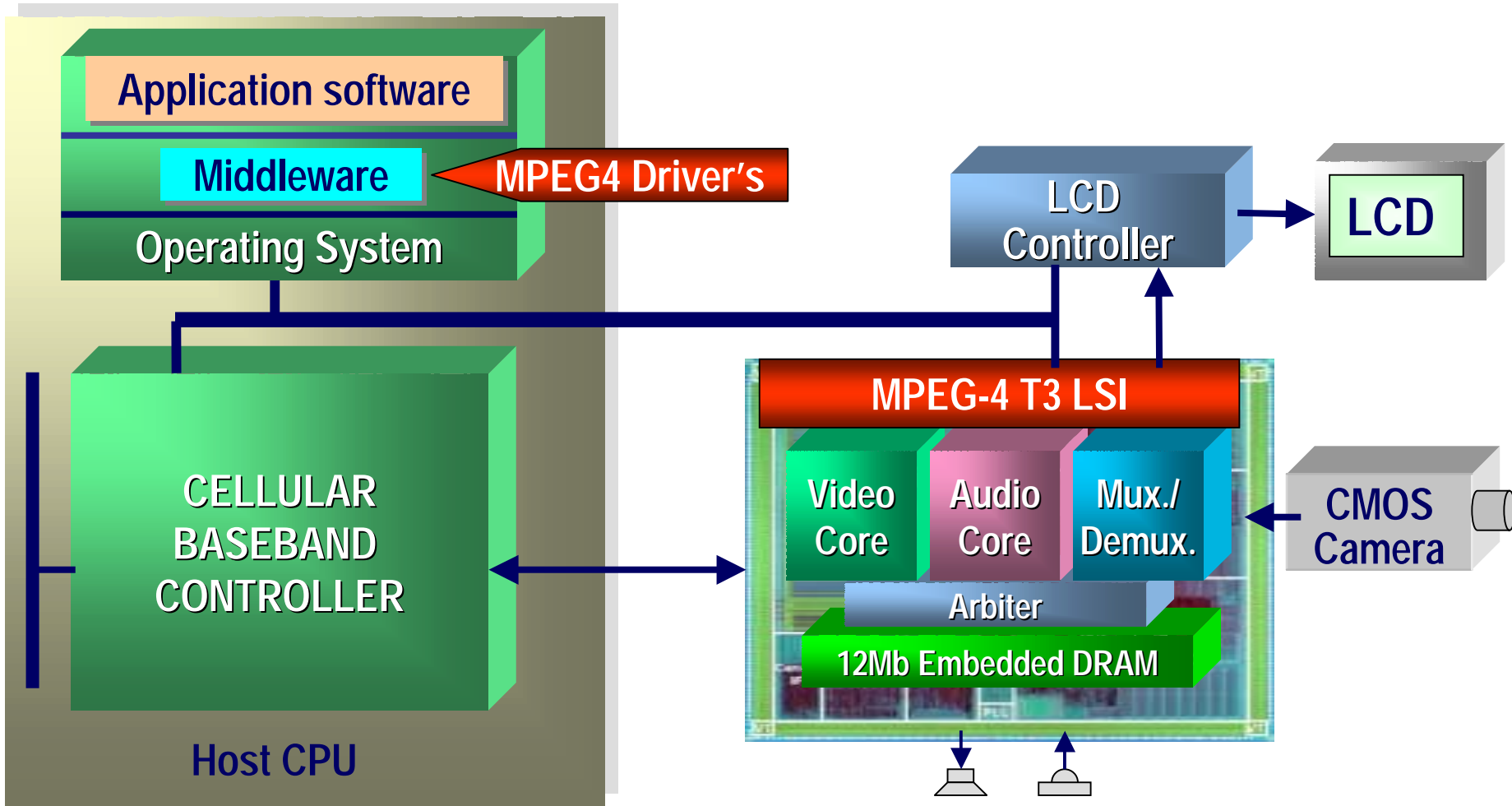
I-mode like terminal



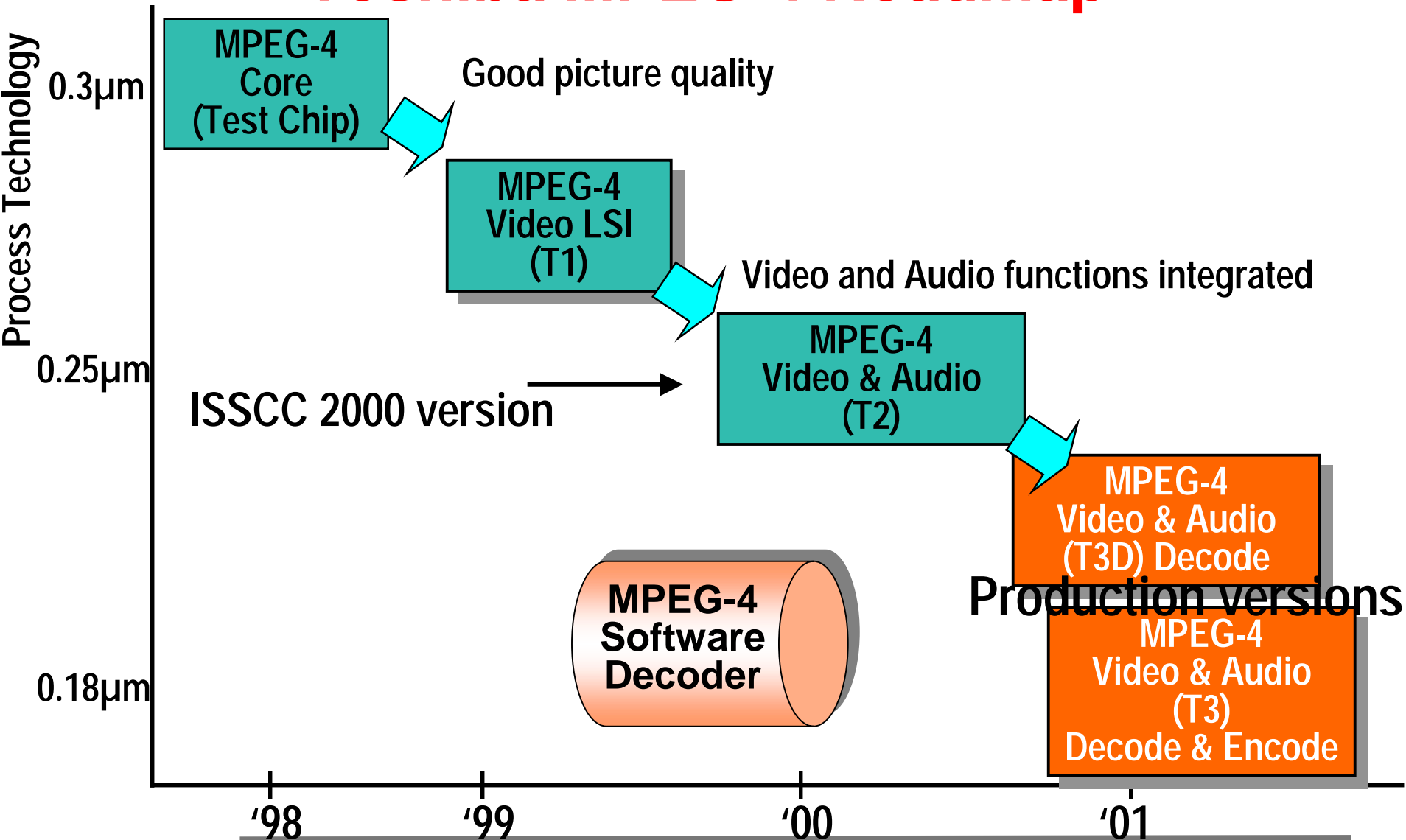
Bluetooth Oriented Models



T3 Application Example



Toshiba MPEG-4 Roadmap



Toshiba MPEG-4 Summary

- **Production versions of low-power, single-chip solutions now available in two formats, one decode only, the other encode and decode**
 - **Leadership in embedded DRAM technologies enables low-power dissipation**
 - **Middleware software available now to support chips**
 - **Also offer a software Decoder, available now for PDA developers**
 - ***Toshiba - the only complete mobile MPEG-4 solution provider - is poised to drive the wireless multimedia market***
-
-