TI ARM Application Processors

TI's ARM Solutions Value Proposition

- **Customers demand Best-in-Class Components**
  - *TI delivers leading-edge, award-winning solutions across the entire ARM technology spectrum*
- **Everything in the world needs an ARM MCU or MPU!**
  - *Rely on TI to supply indefinitely to all market segments*

18 years

TI's Value	TI Adopter's Benefit
✓ **Portfolio Breadth**	• TI was ARM's Lead Partner for Cortex-M3, R4, A8, and A15, and continuing investment! • Largest ARM portfolio in the world, spanning MCU, MPU, Wireless, and Multicore-based applications.
✓ **System Solution**	• Only TI offers the complete 360-degree system solution: – Signal Chain, Power, MCU, MPU, DSP, software, support, ecosystem. • Move from pin-pin compatible ARM, ARM+DSP, and ARM with Video solutions, together with a single, scalable SW Development Kit (SDK).
✓ **Ease-of-Use**	• Intuitive tools to shorten the design cycle & speed time-to-advantage.
✓ **Product Lifetime Supply / Longevity**	• TI owns its own foundries, does not EOL, and has served billions.
✓ **Innovation & Investment**	• Through acquisition, partnership, and innovative integration.
✓ **Service and Support**	• TI's long-standing and renowned standard for highest Q&R. • TI offers the largest field sales/eng team in the IC industry.

Major Trends offer TI Opportunity

Cloud Computing and Access to Content from Anywhere

Explosion of Connected Devices

TI Strategic Position

TI ARM Processor

+

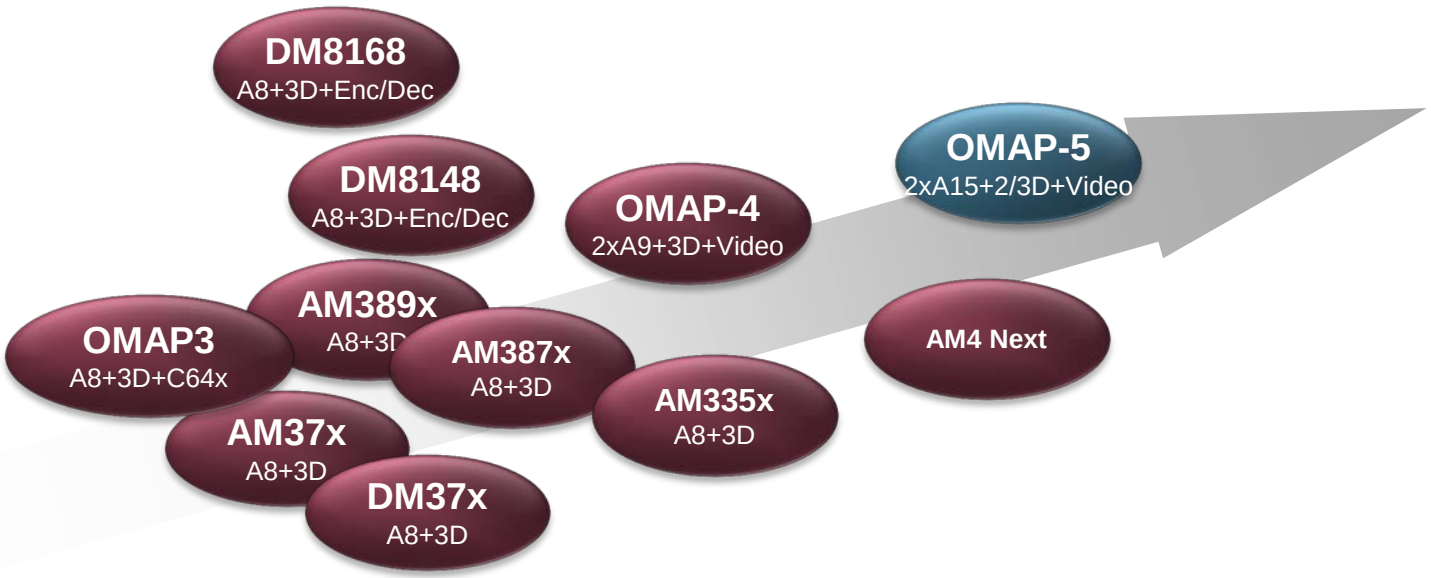
Connectivity

Performance and Power Application Requirements

Demand for Rich User Experiences

TI ARM Devices Portfolio

TI ARM Devices drives performance leadership time to market




Sitara Application Processors

Sitara microprocessors are ideal for:

Applications

Wireless HDD's

Navigation equipment

Barcode Scanners

Home gateways

Portable data terminals

Point of service

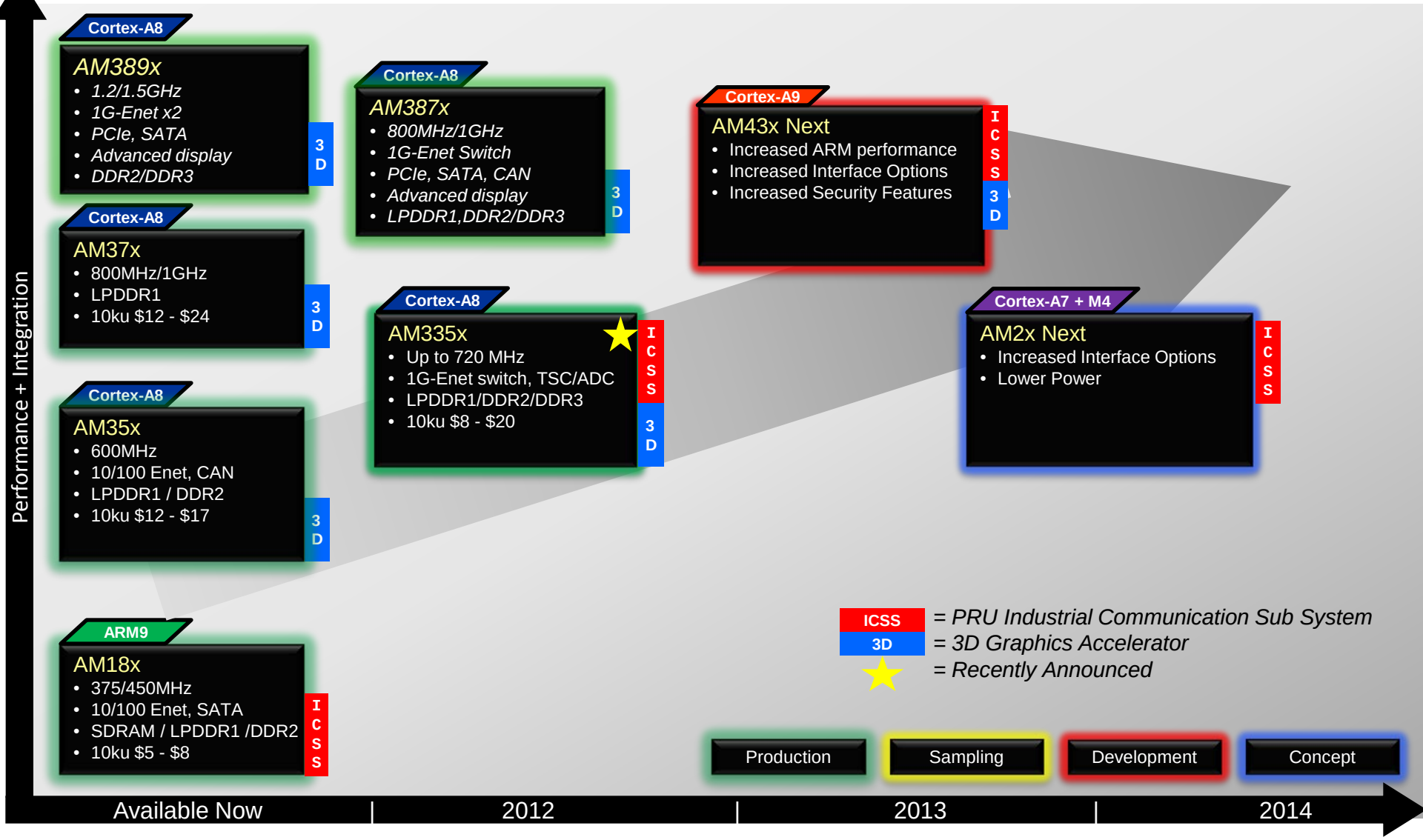
Industrial Automation

Industrial Drives

Requirements

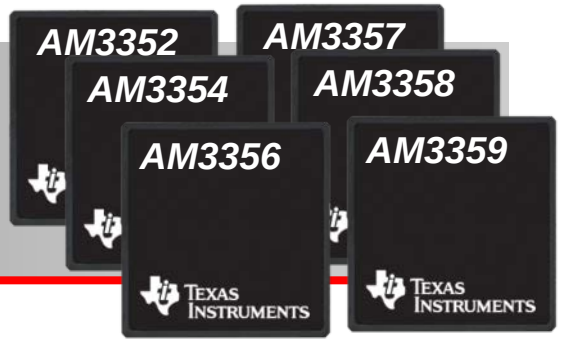
- High Integration
- Connectivity
- Cost effectiveness
- Graphical Interface
- Scalability

Sitara™ ARM® Processor roadmap



Highly integrated, power-efficient ARM Cortex™-A8 at ARM9™ prices

Highest ARM DMIPs per dollar today!



Lower system cost with support for DDR2/DDR3 memory, integrated GbE, CAN, and PRU

Full function and low cost development platforms fit your evaluation and cost requirements

ARM® Cortex™-A8 performance at ARM9™ prices unlocks infinite possibilities in electronics

Instantly upgrade with vivid 3D interactive graphics, touch screen interfaces, faster performance, wireless connectivity AND add:

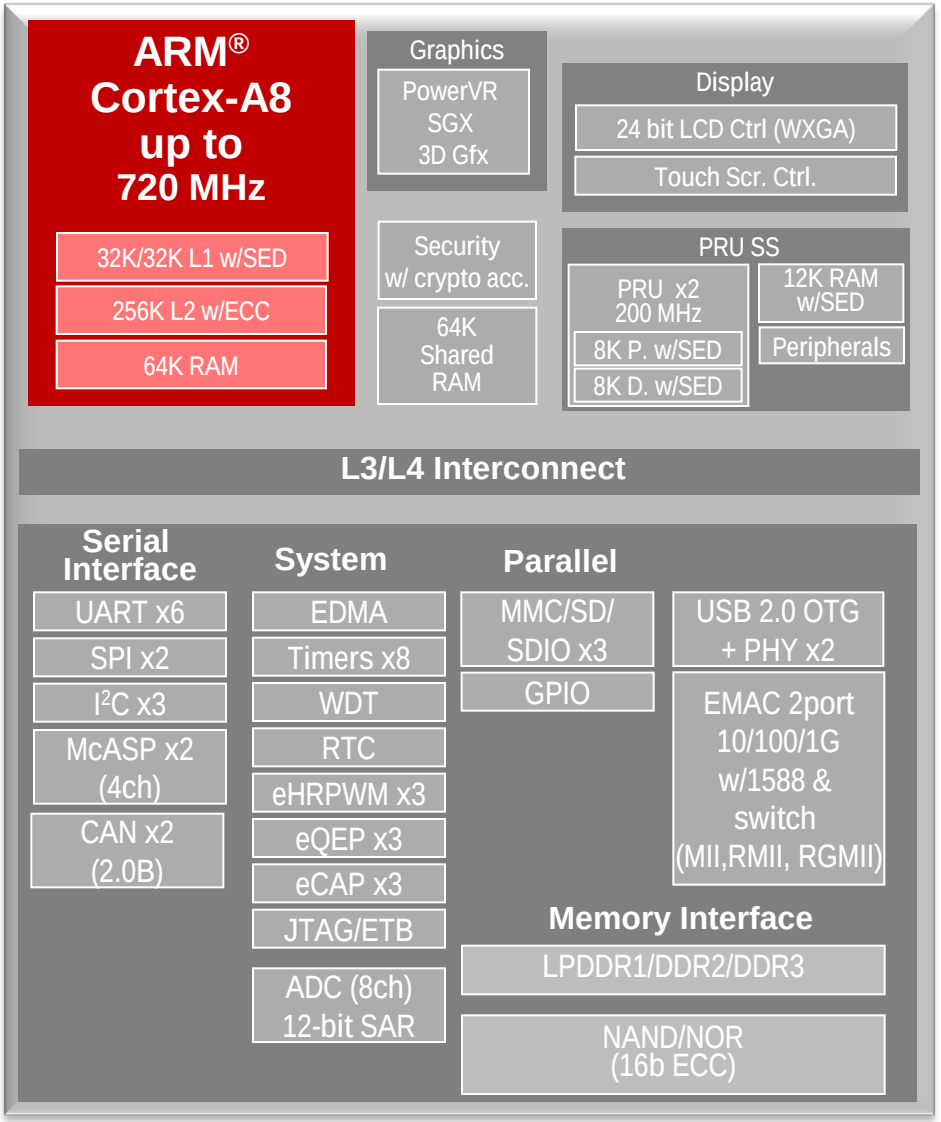
	Before: ARM9/MCU		After upgrade to: AM335x ARM MPUs
Portable navigation systems		*Faster 3D route calculation and map updates*	
Handheld educational and gaming devices		*Better game logic processing ability and Internet multi-player gaming*	
Home and building automation		*Intuitive and personalized interaction and synch with mobile phone*	

On-chip integration increases design flexibility

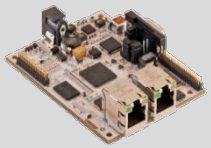
Performance AND low power:
- 720 MHz for faster processing for system control and OS support
- 7 mW standby power; 700 mW active power

Integrated 3D graphics and touch screen controller:
- Enable 3D GUIs and touch screens

On-chip peripherals provide:
- Cost optimization
- Fast network connectivity
- Data protection
- Adaption to new standards
- Connection to sensors, actuators, control devices and more



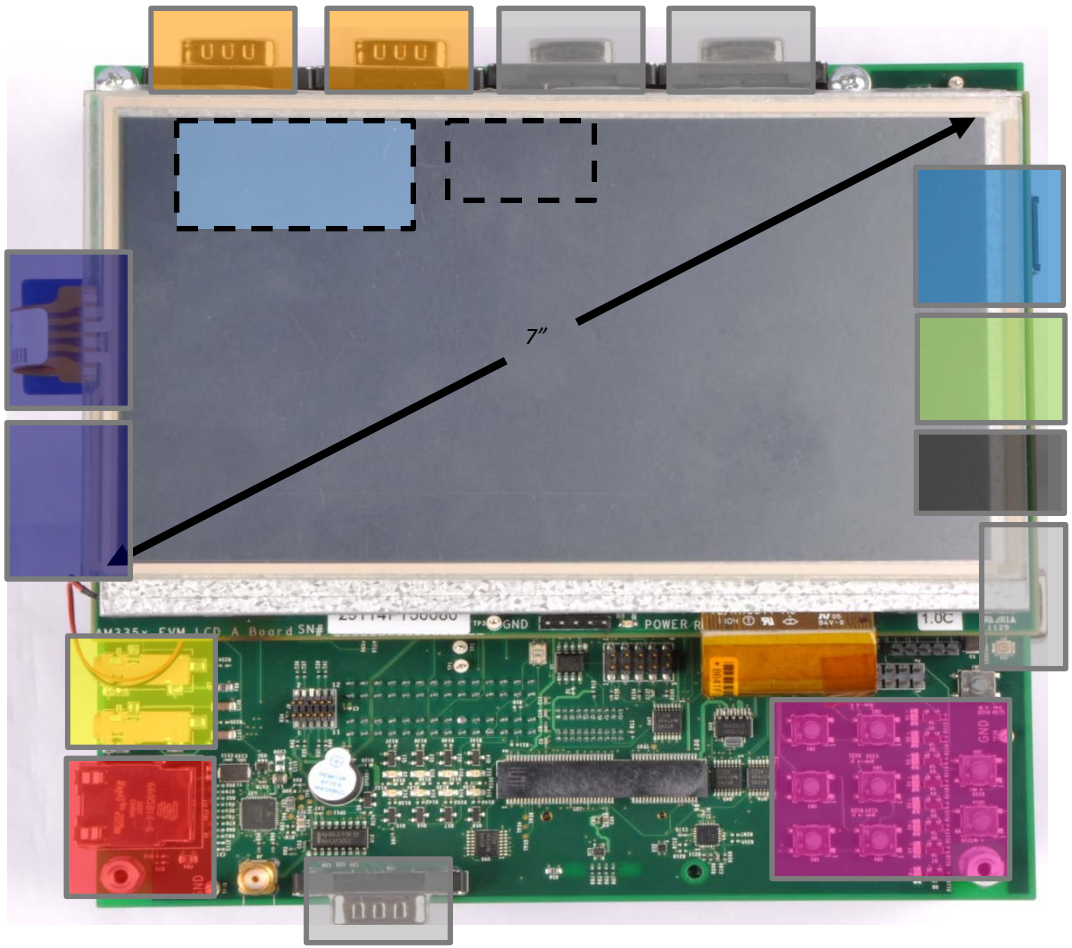
Get to market fast with AM335x dev. tools

	AM335x EVM (TMDXEVM3358)	AM335x Starter Kit (TMDSSK3358)	Industrial Dev. Kit (TMDXIDK3359)	Industrial Communications Engine (TMDXICE3359)	BeagleBone
					
uP/Freq	AM3358 – 720MHz	AM3358 – 720MHz	AM3359 – 720MHz	AM3359 – 720MHz	AM3358 – 720MHz
Memory	512MB DDR2	256MB DDR3	512MB DDR2	256MB DDR2	256MB DDR2
Display	7” Touch/LCD	4.3” Touch/LCD	N/A	N/A	Optional
PMIC	TPS65910	TPS65910	TPS65910	TPS65910	TPS65917
WLAN/ BT	WL1271	WL1271	N/A	N/A	N/A
Features	Advanced Connectivity RS-232 (4) 10/100 Ethernet CAN	2x Gb Ethernet ports USB JTAG Zigbee Connector Accelerometer	PROFIBUS I/F CAN PWM Controllers Motor Axis Feedback	Temp Sensor USB JTAG Industrial Protocols CAN	USB-Powered 10/100 Ethernet Expansion USB JTAG
Software	Android, Linux, StarterWare, WinCE	Android, Linux, StarterWare	SYS/BIOS, StarterWare	SYS/BIOS, StarterWare	Linux, Android, StarterWare
Available	Now	3Q12	Now	Now	Now
	$995	$199	$895	$99	$89

Texas Instruments

AM335x evaluation module

$995



- *720MHz AM3358 processor*
- *512MB DDR2 SDRAM*
- *7” LCD resistive touchscreen*
- *Accelerometer, temp sensor, light sensor*
- *Test/measurement points*

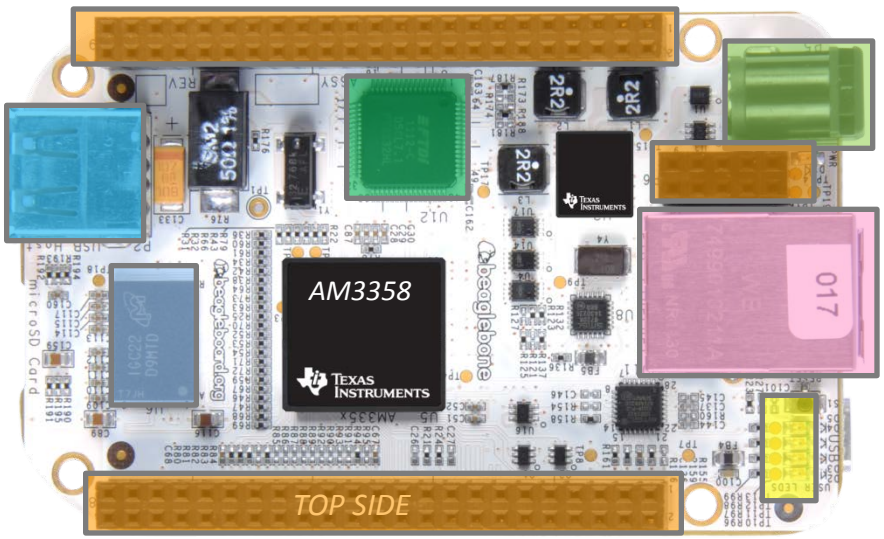
- *Serial/RS-232 (4)*
- *10/100 Ethernet (1)*
- *5V Power Supply*
- *Power Switch*
- *Navigation/Buttons*
- *WL1271 WiFi/BT Module*
- *SD/MMC (2)*
- *USB 2.0 OTG (2)*
- *Audio in/out*
- *JTAG*
- *CAN (2)*

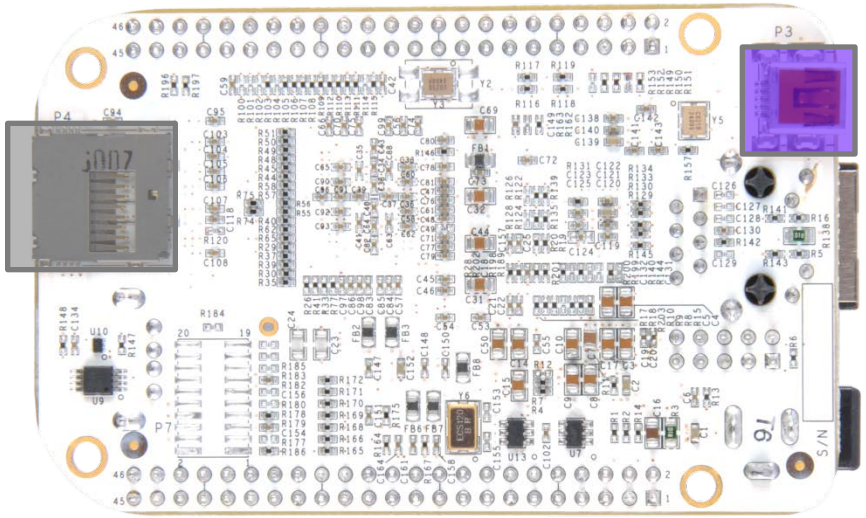
BeagleBone

Enabling Cortex™-A8 development at $89

$89 MSRP

- *Size of a credit-card*
- *Extensive hardware connectivity with Linux*
- *Large open source community support*
- *Single cable and 10-second Linux boot*
- *Order from www.beagleboard.org*





- USB 2.0 Host
- 5V Power Supply (opt.)
- 10/100 Ethernet
- TI Power Mgmt
- On-board emulator
- 256MB DDR2
- LEDs
- Expansion (3)
- MicroSD
- USB 2.0 Client

Sitara™ ARM® Processors software & ecosystem

Complementing great processors with great software!

- *Production quality Software Development Kit including:*
  - *Drivers and kernel port to Linux, Android, Windows Embedded CE and other industry leading operating systems (Green Hills, QNX, etc…)*
  - *Development tools for Linux and Windows Embedded CE*
  - *Proof-of-concept demonstration and example software*
- *Active open source community accompanied by the world's largest ecosystem of 3rd party tools and application specific solutions*


High-level operating systems

Highly reusable software code base enables scaling between TI Sitara ARM processors and across TI's embedded processing portfolio

Linux

- **Developed & supported by TI**
- **Royalty free BSP/SDK, example applications and benchmarks**
  - *BSP includes: Linux drivers, UBoot, Linux file system*
  - *SDK includes: BSP release plus graphics SDK (OpenGL ES API), Qt framework, performance benchmarks, graphical application launcher, flashing tool and pin-mux utilities*
  - *Commercial Linux support available from partners*

http://www.ti.com/tool/linuxezsdk-sitara

Android

- **Developed & supported by TI**
- **Royalty free BSP/SDK, example applications and benchmarks**
  - *Includes: Linux Kernel, Uboot x-loader, 3-D Graphics OpenGL driver & libraries, Adobe Flash 10 libraries for Android, RowboPERF, performance benchmarking application, example applications including 3-D Graphics, host tools, debugging options*
  - *Commercial Android support available from Mentor Graphics*

http://www.ti.com/tool/androidsdk-sitara

Ice cream sandwich support!

Windows Embedded*

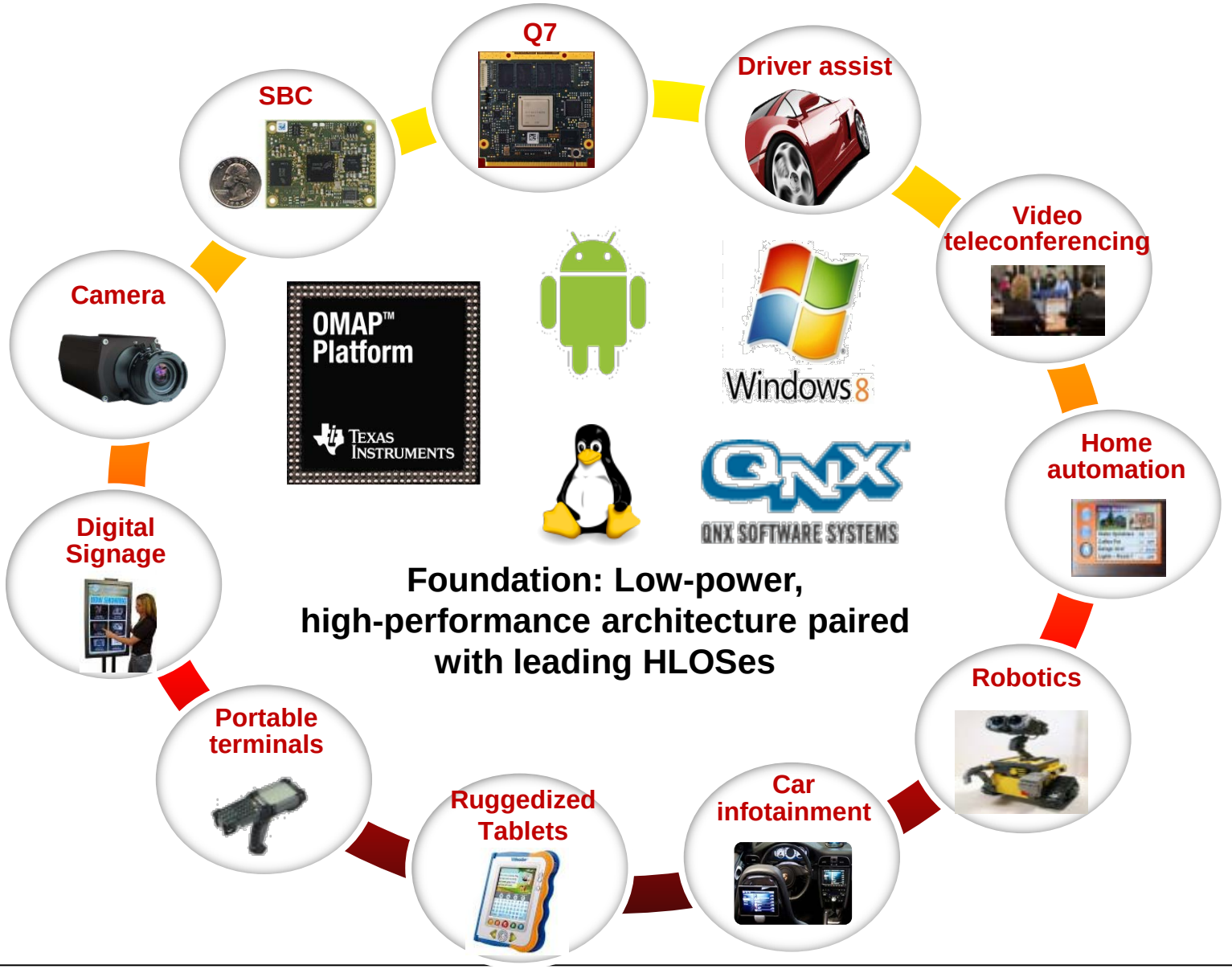
- **WEC7 and WinCE 6.0 R3 SDKs available from Adeneo Embedded**
  - *Includes: Kernel Production Quality OEM Abstraction Layer (PQOAL), KITL debug connectivity support, Device drivers for TI Cortex-A8 processor and EVM peripherals, 3D Graphics SDK, DirectShow Filters for various multimedia codecs, Example applications*

http://www.ti.com/tool/wincesdk-a8

** Windows Embedded requires runtime royalties to Microsoft*

OMAP Application Processors

OMAP Markets and Customers are Expanding



OMAP Roadmap

OMAP4

OMAP™ 4430 — 800 MHz, 1GHz

OMAP™ 4460 — 1.2 GHz, 1.5 GHz

OMAP™ 4470 — 1.3 GHz, 1.5 GHz

Graphics+

WCE7
WM6.5

WCE7
WM6.5
V.Next

- *Dual Core ARM Cortex A9 Processor*
- *Accelerated Graphics via SGX54x core*
- *Full HD video encode and decode*
- *Best in class power/performance*
- *Highly optimized Windows and Android OS*
- *Single platform for Android, WCE, WM, V.Next*

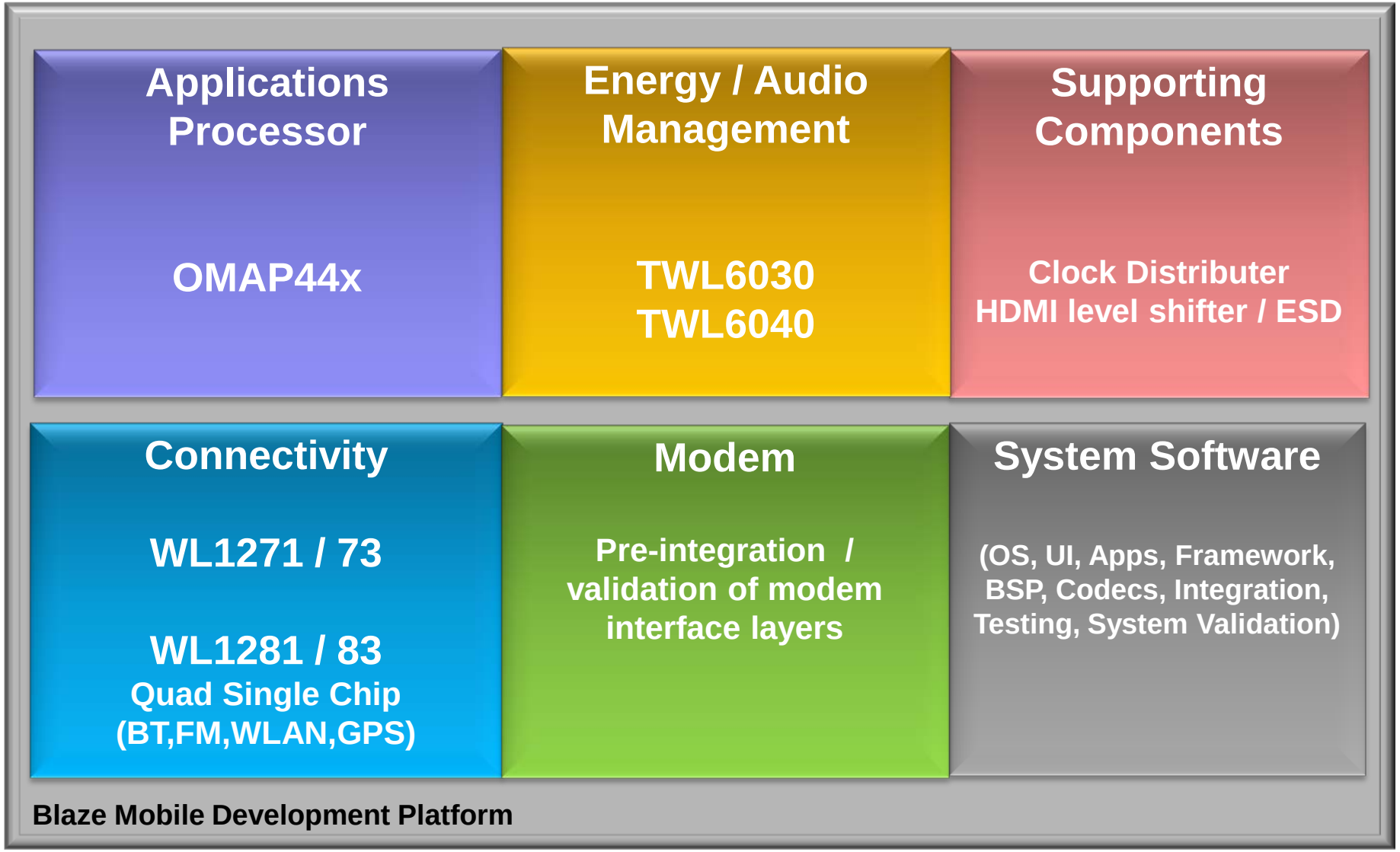
OMAP5

OMAP™ 54xx

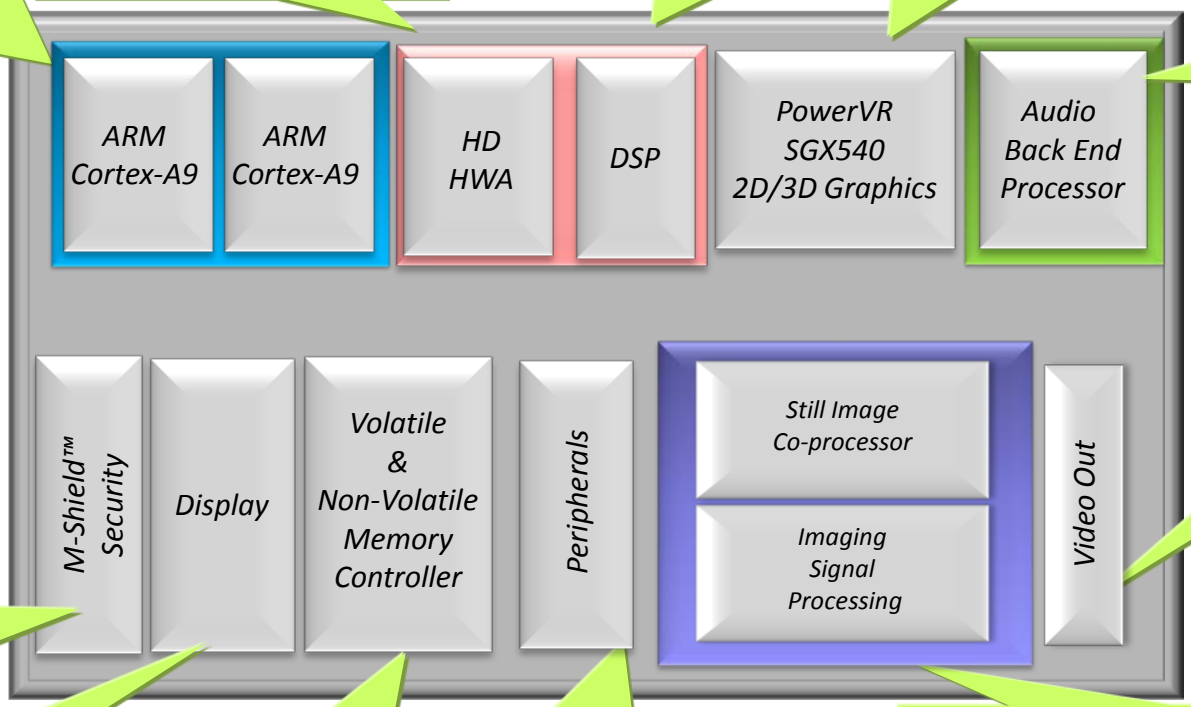
- *Dual Core ARM Cortex A15 Processor*
- *Dual Core Graphics Acceleration*
- *LPDDR2 or DDR3 memory options*
- *Increased HD capabilities*
- *Gesturing/3D*
- *28 nm process*

	ARM Speed	DDR Frequency LPDDR2	Graphics Perf.	Video Perf.	Display
OMAP4430	**800MHz & 1GHz**	**Dual 400MHz**	**SGX540 307MHz 40MΔ/s 1535Mpix/s**	**331MHz 1080p30 enc/dec**	**Multi overlay triple display HDMI1.4a 3D**
OMAP4460	**1.2GHz & 1.5GHz**	**Dual 400MHz**	**SGX540 384MHz 50MΔ/s 1920Mpix/s**	**430MHz & 500MHz 1080p30 enc/dec**	**Multi overlay triple display HDMI1.4a 3D**
OMAP4470	**1.3GHz & 1.5GHz**	**Dual 466MHz**	**SGX544 384MHz 70MΔ/s 1920Mpix/s**	**430MHz & 500MHz 1080p30 enc/dec**	**Multi overlay triple display HDMI1.4a 3D**

OMAP44x “Maverick” Platform



OMAP44x Block Diagram



Symmetrical Multi-processing

Up to 1GHz (1.2v) per core, 5000 DMIPS

Processing power for multiple concurrent applications, and no compromise full Internet browsing

True HD Video multistandard 1080p 30fps playback and record

Programmable DSP for audio and emerging video standards

Future Proofing

OpenGL® ES 2.0 to deliver immersive user interface, advanced gaming, rich 3D mapping

1535M pix/s, 4.9 GFLOPs

Virtual Low Power Audio IC for back end processing (buffering, SRC, equalization etc)

***HDMI v1.4** and composite outputs to drive displays*

Securing Content, DRM, Secure Runtime, IPSec

Larger, Color Rich Display up to WUXGA and support for concurrent high resolution displays

HW Bandwidth Memory Interfaces

Dual Channel 400MHz LPDDR2, MLC/SLC NAND, NOR Flash etc

Industry Standard Peripherals

MMC/SD, Slimbus, USB, HSI, CSI2, UART, SPI, McBSP

DSC Quality Imaging

up to 20M pixel <1s sts

noise filtering, image/video stabilization and face detection, image enhancements

OMAP4 Blaze Mobile Development Platform

- System implementation of OMAP44x “Maverick” Platform
  - Cost effective platform for SW development
  - Leveraged by TI for sw development, power/performance optimizations and validation
  - Addresses all the key needs of the open-source community, HLOS partners and SW developers

- Features
  - OMAP4430 (Applications Processor)
  - TWL6030, TWL6040 (Audio/Power management IC)
  - WL1281 (WLAN, Bluetooth, FM, GPS Combo IC)
  - Integrated picoDLP projector
  - Dual capacitive touch WVGA displays
  - 3 cameras (main camera: 12MP camera sensor)
  - LPDDR2 and NAND memories
  - MMC / SD slot
  - HS USB2.0
  - HDMI output
  - QWERTY keyboard
  - Accelerometers
  - Ethernet
  - JTAG and other debug connectors
  - Power measurement ports
  - Expansion board for more signal visibility and debug
  - Expansion board for modem connectivity
  - And more ...

- Availability: now

Blaze Tablet2 Development Platform

System implementation of OMAP44x Platform

Cost effective platform for SW development
Used by TI for SW development, power/performance optimizations and validation
Addresses the key needs of the community, HLOS partners and SW developers

Features

OMAP4460 (Applications Processor)
1 GB lpDDR2 and 32 GB eMMC v4.41
TWL6030 Power Management IC with TP62361
TWL6040 Audio IC
WL1283 (WLAN, Bluetooth, FM, GPS Combo IC)
10.1” 1280 x 800 display with capacitive touch
HDMI and DisplayPort output
External Camera Module options
- 12 MP
- 8 MP
- 5 MP

External MMC / SD slot
Internal SD slot (expansion functions)
Two HS USB2.0
HS USB OTG
PCIe Expansion slot for modem connectivity
Gyro, Accelerometer, Compass sensors (and more …)
Ethernet, JTAG and other debug connectors
Power measurement ports

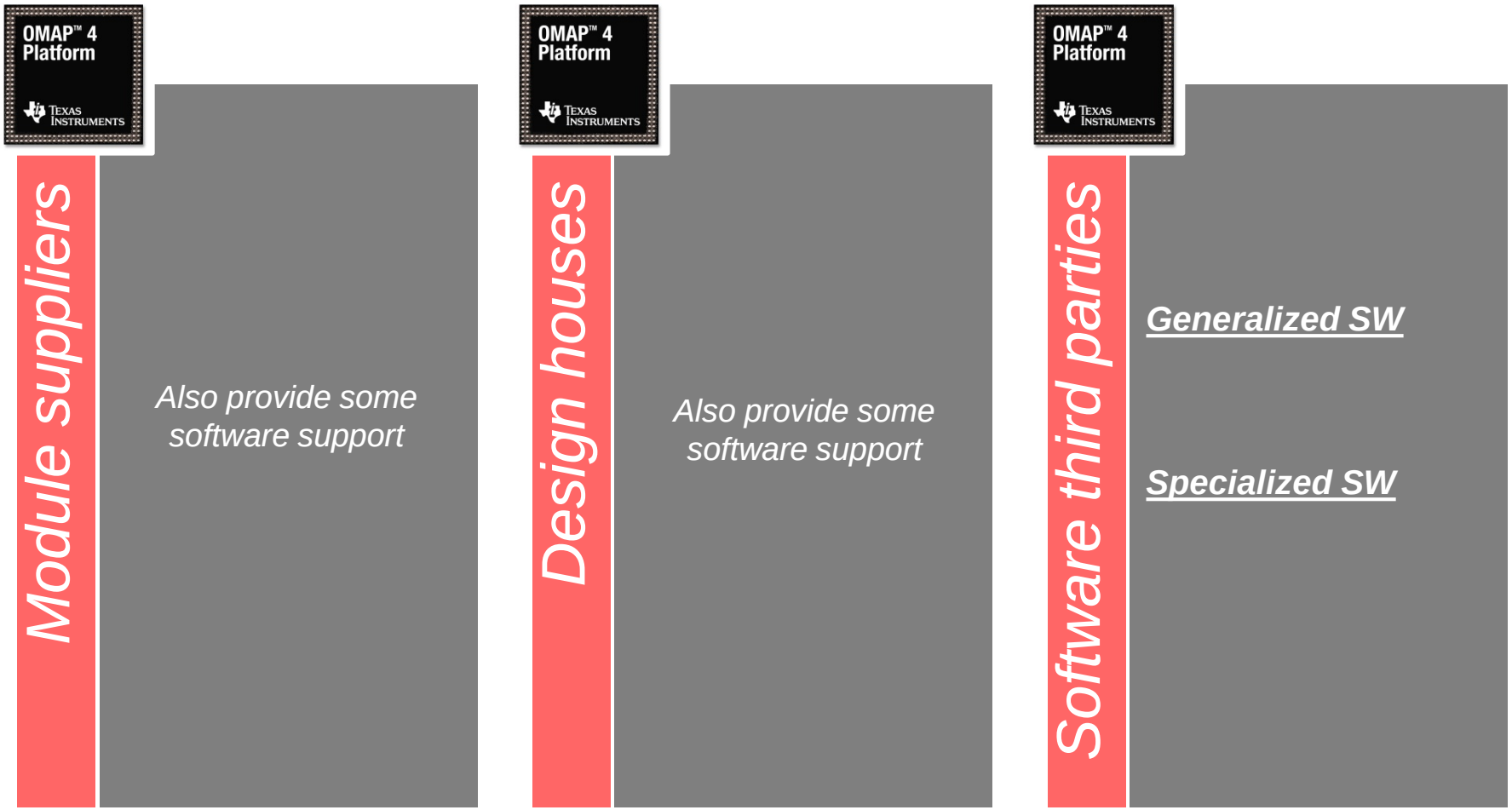
OMAP4 - PandaBoard Community Platform

pandaboard.org

Low cost OMAP4 development platform based on dual-core ARM Cortex™-A9
Community supported at www.pandaboard.org
Available from Digikey (179$)

- *OMAP4430/60 Applications Processor*
- *1 GB lpDDR2*
- *TWL6030 Power Management IC*
- *TWL6040 Audio IC*
- *WL1271 module WLAN/BT IC*
- *DVI-D display output*
- *HDMI multimedia output*
- *General purpose expansion connector*
- *LCD expansion connector*
- *Camera expansion connector*
- *SD/MMC card slot*
- *Two HS USB2.0 host ports*
- *One HS USB OTG port*
- *UART*
- *Wired Ethernet*
- *JTAG*
- *Debug LEDs*
- *Power and reset buttons*
- *5V wall power input*

Strategic Industrial Partners



- *Module suppliers support customers who can do most of their own design*
- *Design Houses do full board designs and most do CM services*

TI ARM Solutions
Building a successful partnership

Access to one of the industry's broadest range of ARM® offerings including extensive peripheral support for a variety of markets

Availability of comprehensive software solutions and tools simplify design cycle

Broadest & most localized support to quickly and easily resolve unique design challenges

TI quality process, manufacturing and supply chain

- High-volume production

- Rapid ramp with advanced technologies

- Worldwide supply chain support