Video and Image Processing with DaVinci Processors

Moscow
30.03.2011
TI has over 30 years of Video & Imaging innovation (Broad Market perspective)

1998: TI develops its first video-specific processor

2003: DM642 in production and still sold extensively today

2005: DaVinci™ technology

2006: Portfolio includes ARM9 + Video Accel, DSP + Video Accel, ARM9 + DSP + Video Accel

2008: TI launches Beagle open source community

2009: TI continuously improves Video Accelerator technology

TI launches chip capable of 3x 1080p60

2009-present: Increased software investment in Linux, Android, WinCE, Gstreamer OpenMax...

2008: TI launches OMAP35x processors

2009: TI launches first ARM® Cortex™-A8 offerings

2009: TI launches DM6467 processors

2009: TI launches DM8168 processor

2006: Portfolio includes ARM9 + Video Accel, DSP + Video Accel, ARM9 + DSP + Video Accel

2003: DM64x processor

2005: DaVinci™ technology

TI launches DaVinci™ technology, a portfolio of digital media processors

2009: TI continuously improves Video Accelerator technology

2009: TI launches HD Transcoder chip

2010: TI launches OMAP35x processors


2009: TI launches OMAP35x processors

2010: TI launches OMAP35x processors

2011: OMAP35x processors

1980...
TI has a broad and growing embedded processing portfolio

TI Embedded Processors

- **Microcontrollers**
  - 16-bit & 32-bit MCUs
  - 32-bit real-time MCUs
  - 32-bit ARM® MPUs
- **ARM® Processors**
  - ARM®+Video
  - ARM®+DSP +Video
- **Digital Signal Processors**
  - Single & Multicore DSPs
  - Ultra Low power DSPs

**Software & Dev. Tools**

**MCUs = Microcontrollers**

**MPUs – Microprocessors**
DaVinci™ offers

**Broad Portfolio**
- Devices supporting a broad range of performance, price, and power consumption points to meet just about every need
- Devices supporting multiple video ports or targeted video segments
- Devices supporting multiple encode, decode, & transcode industry standards with performance up to 3 channels of 1080p60

**Connectivity**
- 10/100/1000 Ethernet
- CAN 2.0 for automotive industry
- High speed USB & USB OTG
- Multiple serial port options per device
- SATA, PCIe
- Flexible LCD controllers
- And more...

**Scalability**
- Software and hardware scalability among DaVinci devices and across other TI processor from C6-Integra and Sitara lines allows customers to leverage investment and migrate as needed to build a broad range of applications for the market.

**Strength of Software**
- Free and easy access to software kits
- Low cost development tools with reference code
- Support for a wide range of Operating Systems which include Android, Linux, WinCE, Nucleus, Integrity, and more...
- Largest Linux and Android open source communities in the industry
- Extensive ecosystem of development partners
DaVinci™ processors are ideal for:

**Design Considerations:**
- Single and Multi-Channel Video up to 3x1080p
- Multi-Format Codec Support (for audio, speech, video, & imaging)
- Graphics / Video (with hardware and software support)
- Imaging Applications
- DSP & ARM Headroom (with video accelerators offloading much of the compression processing)
- Video System BOM Integration (with integrated front-end and back-end imaging tools on chip)
- Portable Video Applications (with low power consumption)

**Applications such as:**
- IP Network Cameras
- Video Communications
- IPTV
- Digital Signage
- Portable Media Players
- Automotive Vision
- Portable Medical Products
- Thin Client
- Smart Displays
**DaVinci™ Digital Media Processors**

Available Now: Did I mention video accelerators?

### ARM™ + Video Accelerators

- DM36x
- DM355
- DM357
- DM335

**Optimum Consumer Video**

- Enhanced video processing subsystem (w/ integrated front-end and back-end imaging interfaces)
- ARM9 processor and powerful co-processors
- Low-power design (<850mW total power)

### DSP + Video Accelerators

- DM6431/3/5/7
- DM648
- DM647

**Enhanced Video with Real-time Signal Processing**

- Enhanced video processing subsystem
- High-level of application specific integration to reduce system cost for communications and surveillance applications

### ARM™ + DSP + Video Accelerators

- DM816x
- DM814x
- DM3730/25
- DM6467/T
- DM6446

**Advanced Video and Graphics**

- Enhanced video processing subsystem
- High performance multi-format video up to 1080p
- Ideal for Video, Imaging and Vision applications
- 3D graphics processor

Support for Linux, Windows® Embedded CE, Android, & RTOS

= Featured products
DaVinci™ Digital Media Roadmap

Performance Optimized

DM6467T
- 1080P60 enc/dec
- C64x+ARM9

DM37xx
- 720P enc/dec
- Cortex-A8
- Up to 1GHz
- 3D graphics

DM38x (1Q12)
- 1080P30 enc
- Cortex-A8
- Up to 720MHz
- Adv image co-proc

DM644x
- Up to 720P enc/dec
- C64x+ARM9
- OSD capable

DM643x
- C64x
- Low cost SD video

DM368
- 1080P30
- 432Mhz ARM9
- Image signal processing (ISP)

DM37xx
- 720P enc/dec
- Cortex-A8
- 3D graphics

DM816x
- Up to 3x 1080P60
- C674x+Cortex-A8
- Up to 1.5GHz
- 2x 1G-Enet
- 2D/3D Graphics
- PCIe, USB
- DDR2/DDR3
- Up to 3X Display

DM814x
- 1x 1080P60
- C674x+Cortex-A8
- Up to 1GHz
- 1G-Enet Switch
- 2D/3D Graphics
- PCIe, USB, CAN
- LPDDR/DDR2/DDR3

DM HP Next (2013)
- nX 1080P60
- C66+Eagle
- EVE vision accel.
- nX 3D Graphics
- nX Display
- 28nm

DM LP Next (2013)
- 1080P60
- C66+Eagle
- 3D Graphics
- High res display
- 28nm

Value Line

DM355
- MPEG4 720P
- 225Mhz ARM9
- Image signal processing

DM64x
- SD/HD video
- C64x
- Multiple video ports

DM644x
- Up to 720P enc/dec
- C64x+ARM9
- OSD capable

DM643x
- C64x
- Low cost SD video

DM365
- SD/HD video
- C64x
- Multiple video ports

DM368
- 1080P30
- 432Mhz ARM9
- Image signal processing (ISP)

DM37xx
- 720P enc/dec
- Cortex-A8
- Up to 1GHz
- 3D graphics

DM816x
- Up to 3x 1080P60
- C674x+Cortex-A8
- Up to 1.5GHz
- 2x 1G-Enet
- 2D/3D Graphics
- PCIe, USB
- DDR2/DDR3
- Up to 3X Display

DM814x
- 1x 1080P60
- C674x+Cortex-A8
- Up to 1GHz
- 1G-Enet Switch
- 2D/3D Graphics
- PCIe, USB, CAN
- LPDDR/DDR2/DDR3

2010
2011
2013

Speeds shown are for commercial temperature. Dates approximate initial samples. Not all peripherals shown.
DaVinci™ software and ecosystem

Complementing great processors with great software!

- Production quality Software Development Kit including:
  - Support for Linux, Android, WinCE and other industry leading operating systems (Green Hills, QNX, etc...)
  - Low cost development tools
  - Proof-of-concept demonstration and example software
- Large and active open source community accompanied by the world’s largest ecosystem of 3rd party tools and application specific solutions
Get to market fast with best-in-class tools and development platforms

**Development Tools**

Development tool options allow designers of all experience levels to quickly develop applications

- Design
- Code and build
- Debug
- Analyze
- Tune

- Green Hills Software Inc.
- RealView
- CodeSourcery
- Lauterbach

**Development Boards**

**Low cost boards < $200**

- DM368 Leopard - $149
- Beagle-XM - $149

**Full Featured Eval < $2000**

- DM365 - $595
- AM/DM37x - $1495

**Reference Designs**

**On-Demand Support**

- Local Support
  - Industry’s largest field sales / applications team
- WIKI’s
  - www.ti.com/davinciwiki
- E2E Forum
  - www.ti.com/e2e
- Training
  - www.ti.com/training
- TI Web/Product Folders
  - www.ti.com/Davinci
  - www.ti.com/arm
- Linux Community
  - Beagleboard.org
  - leopardsboard.org
- Open Source Projects
  - Designsomething.org
DaVinci™ technology and you...

Live...

Work...

Play...

Yahoo!

Skype®

Google

at&t

orange

Texas Instruments
IP video security is everywhere in today’s life

Major Trends
- Remote Video Security
- Edge Devices (record, store, analyze)
- Megapixel
- Analytics / Built-in intelligence
- Unified solution
Technology for Video Security
Innovation from the Core to the Edge

Smart Analytics IP Cameras
- DMVA1
- DMVA2
- DMVA
- NEXT

Advanced Analytics IP Cameras
- DM812x

Main Stream IP Cameras (up to 1080p60)
- DM36x
- DM38x

Analog CCTV Cameras
- DM33x
- ISP+ARM

Multi-Ch Hybrid DVR with Advanced Analytics (1GHz C674x) and VMS (1GHz Cortex A8)
- DM816x
- DM814x
- DM81xx
- TVP5158

Advanced Analytics Daughter Card
- DM6435

Smart Analytics IP Cameras (New!)

OR

New!

Innovation from the Core to the Edge

Technology for Video Security
DaVinci™ Hybrid DVR/DVS Roadmap
Complete Video Security Portfolio

Channels / Video Performance

1 - 2 D1 Channels
DM647/8
DSP Only
2D1 H.264
DM6446
ARM9 405 MHz
2D1 H.264
DM355
ARM9 270 MHz
2D1 MPEG4

2 - 8 D1 Channels
DM6467T
ARM9 500MHz
8D1 H.264
4+4+4 H.264
DM6467
ARM9 365 MHz
4D1 H.264
DM365
ARM9 300 MHz
H.264
(2+1)* D1 H.264

4 - 16 Channels
DM8167/8
Cortex A8 720MHz-1.2GHz
High-end
16+16+8 H.264
16+16+16 H.264
DM8165/6
Cortex A8 720MHz-1.2GHz
Mid/High-end
8+8+8 H.264
DM8147/8
Cortex A8 600MHz-1GHz
Low/Mid-end
4+4+4 H.264
or (16+10) CIF
DM81xx
Cortex A8 720MHz-1GHz
Ultra Low-end
4/8 channel CIF
H.264

Sampling
Development
Production

(1): Simultaneous D1 Record + CIF Network + D1 Playback for Hybrid DVR
(2): Closed loop D1 Record + CIF Network + D1 Playback for DVR

Preliminary
DaVinci™ IP Camera Processor Roadmap
From ultra low cost to full HD, and now with smart analytics

**Performance / Features**
- **DM6467T**
  - ARM9 500 MHz
  - 1080p30 H.264 + 600MHz (1) VA
  - DSP MIPS available for analytics
- **DM6467**
  - ARM9 300 MHz
  - 720p30 H.264 + 400MHz (1) VA
- **DMVA3**
  - A8 ~600MHz
  - 1080p30 H.264 + ISP5 + Smart Analytics
- **DMVA4**
  - A8 720-1000MHz
  - 1080p60 H.264 + ISP5 + Smart Analytics
- **DM368**
  - ARM9 432-486 MHz
  - 720p30 H.264 + ISP5
  - 1080p30 H.264 + ISP5
- **DM38x**
  - A8 600-1000MHz
  - 1080p60 H.264 + ISP5
  - Pin2Pin

**Development**
- **DMVA1**
  - ARM9 300 MHz
  - D1 H.264 + ISP5 + Smart Analytics
- **DMVA2**
  - ARM9 >400 MHz
  - D1 H.264 + ISP5 + Smart Analytics
- **DM365**
  - ARM9 216 MHz
  - D1@30fps H.264 + ISP5
- **DM365**
  - ARM9 270/300 MHz
  - 720p30 H.264 + ISP5

**Production**
- **DMVA2**
  - ARM9 >400 MHz
  - D1 H.264 + ISP5 + Smart Analytics
- **DM365**
  - ARM9 216 MHz
  - D1@30fps H.264 + ISP5

**Sampling**
- **DMVA1**
  - ARM9 300 MHz
  - D1 H.264 + ISP5 + Smart Analytics
- **DM365**
  - ARM9 216 MHz
  - D1@30fps H.264 + ISP5

**4-12 Megapixel**
- **DM8127**
  - A8 600-1000MHz
  - 1080p60 H.264 + ISP5 + DSP MHz (1) VA

(1): DSP MIPS available for analytics

Preliminary
Develop a Scalable Product Line Quickly with TI Single Platform Approach

Next Generation of Core IPs
- **Video Coprocessor**
  - HD VICP 2.0

- **Peripherals**
  - ISP5
  - SGX530 / 3D

- **CPUs**
  - Cortex A8
  - C674x DSP

- **Display Sub System**
  - HD VPSS

DM816x
- DVR/NVR
- High-end Segment

DM814x
- DVR/NVR
- Mid-end Segment

DM812x
- Megapixel IP Camera
- Up to 1080p60/4Mp 30fps
- + DSP MHz

DM812x
- Megapixel IP Camera
- Up to 1080p60/4Mp 30fps

DM38x
- Megapixel IP Camera
- Up to 1080p60/4Mp 30fps

Pin2Pin Compatible
Pin2Pin Compatible

- TI next generation SoC for Video Surveillance leverage same core IPs
- Combination of high-performance & mobile/low power Technology
- Multiple derivatives tuned to your application

Lower Features / Cost

Production
Sampling
Development

Preliminary
Single investment on DM81xx platform allows customer to build one & deploy unified solutions.

TI provides application source code, customer differentiate on top.

**DM812x**
- Sensor
- 1x HD VICP 2.0
- ARM® Cortex A8
- ISP5
- C674x
- 2D/3D Graphics
- HD VPSS
- HD VICP 2.0
- Low power 45nm process

**DM816x**
- Sensor
- 3x HD VICP 2.0
- ARM® Cortex A8
- ISP5
- C674x
- 2D/3D Graphics
- HD VPSS
- HD VICP 2.0
- High Perf. 40nm process

**Digital Media SDK**
- Graphic SDK Package
- OpenMax API
- Syslink Package
- Linux PSP Package

**Customer Application**
- TI Reference Design Application

---

(1): HD Video Processing Sub-System
(2): HD Video Imaging Co-Processor 2.0
TI Embedded Processing Building Blocks

One EVM, One EZ SDK – Software & Pin-to-pin Compatible Devices

- **3D Acceleration for advanced 3D GUIs and gaming**
- **ARM® for OS, Display, User Interface and Connectivity**
- **HD Video Acceleration for Compression & Decompression to save ARM MIPS**
- **DSP for Intensive Signal Processing**
- **3D** (optional)
- **ARM®**
- **Integra™**
- **Sitara™**
- **Video**
- **DSP** (optional)
- **3D** (optional)
- **ARM®**
- **DaVinci™”
- **3D Acceleration for advanced 3D GUIs and gaming**

**Texas Instruments**
DM8168 Processor

**Cores**
- ARM Cortex A8™ (MPU) *up to 1.2 GHz*
- C674x™ Floating Point DSP Core *up to 1 GHz*

**Memory**
- ARM: 32KB L1-Cache, 32KB L1 D-Cache, 256K L2
- DSP: 32KB L1-Cache, 32KB L1 D-Cache, 256K L2
- Two DDR-1600 Controllers

**Coprocessors/Subsystem**
- 3 HD VICP 2.0 Accelerators at 533 MHz
  - Real-Time, Multi-HD Encode/Decode
- 3D Graphics engine – 30+Mtriangles/sec
- Display Subsystem

**Peripherals**
- Gigabit EMAC x2
- USB 2.0 Ctlr/PHY x 2
- PCIe 2.0 – x1; Supports 2 lanes
- SATA 3.0Gbps x2
- DDR3 – 1600 x2
- HDMI Tx
- SD/SDIO
- McBSP x3, McBSP
- SPI, GPIO, UART, EMAC

**Power**
- Total Power – Typical 8-10W

**Package**
- 25x25, 0.65mm pitch, 1031 ball plastic BGA
  - Via Channels enable low cost design rules -- 4 mil traces and 10/20 mil escape vias

**Video accelerators:**
- Multi-channel 1080p60 HD capability
- DSP fully available for analytics and other data processing

Up to 2400 Dhrystone MIPS
- Utilize ARM for OS and application processing & networking

6000 MFLOPS
- Natively supports single/double-precision floating point

TI Confidential – NDA Restrictions
DM8148 DaVinci™ Digital Media Processor
HD Video Encode & Decode Processing

**Benefits**
- 1080p video encode and decode
- Compelling Display and 3D Graphical User I/F
- Lower System BOM from high peripheral Integration
- ARM Up to 1440 Dhrystone MIPS
- DSP Up to 3240 MFLOPS
- 3D Graphics up to 25 Mpolygon/sec

**Sample Applications**
- HD Video Conferencing
- Video Surveillance DVRs, DVS, Decoders
- Digital Signage
- Media Client/Player

**Power**
- Total Power – Typical 2W

**Schedule and packaging**
- 18x18, 0.65mm pitch, 580 ball BGA
- 23x23, 0.8mm pitch, 650 ball BGA
  - Via Channels enable low cost design rules -- 4 mil traces and 10/20 mil escape vias
DM8127 Block Diagram
Up to 12 Megapixel H.264 at 10 fps with Video Analytics

- ARM Cortex A8
  - 600MHz, 720MHz & 1GHz
- C674x DSP fixed/floating point
  - C64x+ and C67x compatible
  - 500MHz, 750MHz & 800MHz
- High Definition Video and Imaging Co-Processor (HDVICP) v2.1
- HDVPSS and ISS
  - video input interfaces for external imaging peripherals
    - image sensors
    - video decoders
  - video output interfaces for display devices
    - SD video encoder
    - HDMI transmitter
- PCIe
- Gigabit EMAC with RGMII interface
- USB2.0 OTG
- SD card/SDIO
- UART
- McASP
A family of pin/software-compatible devices

**Target applications**

- **ARM®**
- **DSP**
- **HD Video Coprocessor**
- **3D Graphics Engine**

**Key Peripherals**

- **Peripherals**
  - GigEMAC x2 w/ 3-port switch
  - HDMI Tx
  - PCIe 2.0 w/PHY x1 lanes
  - Display Subsystem (HDVPSS)
- **Peripherals**
  - USB2.0 H,S, w/PHY x 2
  - EDMA x 4
  - SATA2.0 w/PHY
  - SD/MMC x3

**ARM Cortex™-A8**
- Up to 1.0GHz

**C6-Integra™**
- C674x DSP
- Up to 750MHz

**DaVinci™**
- DM8148/7 only
- DM8148/6 only

**DM8148/7 only**
- Up to1080p60 Enc or Dec

**DM8148/6 only**
- Graphics

**AM3874** only
- Test & Measurement
- Industrial Automation
- Machine Vision
- Smart Energy
- Software-Defined Radio

**C6A8148 only**
- Single-board computing
- Network & Communications Processing
- Industrial automation / HMI
- Portable data terminals
- Interactive POS kiosks

**Sitara™**
- Single-board computing
- Network & Communications Processing
- Industrial automation / HMI
- Portable data terminals
- Interactive POS kiosks

**C6A814x**
- ARM Cortex™-A8
- Up to 1.0GHz

**DM814x**
- Video Security
- Video Conferencing
- Digital Media Adapters
- Digital Signage
- Medical Imaging
A family of pin/software-compatible devices

**Target applications**

- **ARM®**
  - Single-board computing
  - Network & Communications Processing
  - Industrial automation / HMI
  - Portable data terminals
  - Interactive POS kiosks
- **DSP**
- **HD Video Coprocessor**
- **3D Graphics Engine**
- **Key Peripherals**
  - GigEMAC x2
  - PCIe 2.0 wPHY x2 lanes
  - HDMI Tx
  - DDR2-800-DDR3-1600
  - EDMA x 4
  - SATA2.0 wPHY
  - Display Subsystem (HDVPSS)
  - SD x1
  - HD Video Input x 2

**Pin Compatible Across Family**

- **Sitara™ AM389x**
  - ARM Cortex™-A8
  - Up to 1.5GHz
  - Graphics
  - AM3894 only
- **C6-Integra™ C6A816x**
  - ARM Cortex™-A8
  - Up to 1.5GHz
  - Graphics
  - C6A8168 only
- **DaVinci™ DM816x**
  - ARM Cortex™-A8
  - Up to 1.2GHz
  - Graphics
  - DM8168 & DM8166 only

**Key Peripherals**

- Test & Measurement
- Industrial Automation
- Machine Vision
- Smart Energy
- Software-Defined Radio

**Applications**

- Video Security
- Video Conferencing
- Digital Media Adapters
- Digital Signage
- Medical Imaging

**Single-board computing**

- Network & Communications Processing
- Industrial automation / HMI
- Portable data terminals
- Interactive POS kiosks

**ARM® Cortex™-A8**

- Single-board computing
- Network & Communications Processing
- Industrial automation / HMI
- Portable data terminals
- Interactive POS kiosks

**C674x DSP**

- Up to 1.0GHz

**C6A816x**

- Up to 1.5GHz

**DM816x**

- Up to 1.2GHz

**Multi-HD Enc or Dec**

**Graphics**

- AM3894 only
- C6A8168 only
- DM8168 & DM8166 only
Building Blocks for the Platform

- Image Subsystem (ISS)
- Video Acceleration (HD VICP)
- Graphics Acceleration (SGX)
- Display Subsystem (HD VPSS)
- Video Analytics
- SW platform
  - OS (Linux, Windows, RTOS)
  - Platform support package
  - Frameworks
  - Codecs
  - Demos, Test Suites

SOLUTION!
IMAGE SUBSYSTEM (ISS)
ISS Components – block diagram
ISS Components

• Protocol Engines
  – One CSI-2 receiver
    • One 4-lane (1 Gbps per lane) for primary camera
  – Parallel interface supported
  – Bayer and YUV formats

• Camera Image Signal Processor (ISP)
  – Highly configurable hard-wired processing for optimal speed and power
    • Can be run from memory or from sensor directly
  – High-speed (200MP/s) image pipe up-to 20MP (4:3) and 16MP (16:9) sensors
    • Higher resolutions possible through “frame division mode”
    • Easily covers 1080p@60fps video with large video stabilization margins

• Still Image Co-Processor (SIMCOP)
  – Programmable MIPS with iMX
  – High-speed JPEG compression with Rotation support (200MP/s)
  – Advanced features for High-Quality mode

• Dual-Core M3

• Non ISS, Camera Usecase Components
  – Hardware Face Detect Engine
  – Tesla DSP
  – TILER
  – IVA-HD
IPIPEIF
- Manages traffic between sensor, memory, ISIF, and IPIPE.
- Supports up to 16-bit sensor data
- Dark frame subtract
- Data decompression
  - DPCM (8-bit to 10-bit and 8-bit to 12-bit)
  - Inverse ALaw
- Horizontal filtering and rescaling
Camera ISP

ISIF
- Lens shading correction
- Data compression
  - DPCM 10-bit to 8-bit and 12-bit to 8-bit
  - ALaw
- Sensor linearization
- Gain and offset controls
- Adaptive black level compensation
Camera ISP

H3A
- Measures statistics in windows for auto-exposure, auto white balance, and auto focus algorithms.
  - Window sums
  - Window sum of squares OR Window min, max
- Up to 56 (H) x 128 (V) windows supported.
- Max window size is 512x512
- Configurable Max H-Window-Count
Camera ISP

IPIPE
- Accepts Bayer and YUV inputs.
- DPC and noise filtering.
- CFA interpolation.
- Advanced color correction with 3DLUT for RGB->YUV conversion.
- Edge enhancement and color artifact suppression.
- Additional statistics collection like histogram, local brightness and video-stabilization
Camera ISP

Resizer
- Two independent resizers.
- 1/256x to 16x scaling factors.
- Optional YUV420 conversion
- Resizer rescales images to **arbitrary sizes** in two modes
  - In normal mode, images are scaled up or down to sizes ranging from x1/16 to x32
  - In down scale mode, images are only scaled down, with less aliasing than normal mode. The minimum size is x 1/256
- 2nd Resizer max output width limited to 1024 pixels.
• JPEG accelerators
  – DCT/VLCD engines support high-speed JPEG encoding up to 200 MPix/s

• Rotation accelerator
  – 90/180/270 degrees
  – Supports all high speed still image and video capture use-cases

• High ISO Noise Filtering (NSF2) accelerator – Second Generation
  – ISO3200 for low-light conditions
    • Luma and/or chroma domain noise filtering
  – Edge-adaptive sharpening

• Lens Distortion Correction (LDC) accelerator:
  – Barrel distortion and pin-cushion distortion correction.
    • Bicubic and Bilinear modes
    • Up to 90MP/s in bilinear mode
    • Can support 1080p@30 video use case
  – Lateral chromatic aberration correction.
  – Generic affine warps for advanced use cases like rotational Video stabilization and still image fusion

• Features 2 IMX image processing cores
  – Opened to THIRD PARTY algorithms.
  – 1.6 GOPS with 16-bit precision
# Face Detection

## Input Image

<table>
<thead>
<tr>
<th>Input image size</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>QVGA input image size. 8-bit luma data</td>
<td>H x V = 320 x 240 = 75 KBytes</td>
</tr>
</tbody>
</table>

## Detection Capabilities

<table>
<thead>
<tr>
<th>Detection Capabilities</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face inclination</td>
<td>+/- 45 deg</td>
</tr>
</tbody>
</table>
| Face direction | Up/Down: +/- 30 deg
| | Left/Right: +/- 60 deg |
| Max detection count | 35 faces |
| Detection result | The following information are provided by the module for each face. |
| | - Size |
| | - Position |
| | - Angle |
| | - Confidence level |
Ducati Sub-System

• Dual Cortex M3, 200Mhz
  – One Core configures and controls the imaging subsystem (ISS) and HDVICP
  – The second core configures and controls the SIMCOP (inside ISS)

• 32KB 4-port/16-bank L1 unified cache (Runs at twice the speed of CPU frequency)

• 16KB ROM

• 64KB RAM

• Cortex M3 system bus directly connects to ISS interconnect
HD-VICP 2.0: TI’S NEXT-GENERATION VIDEO COMPRESSION ENGINE
HDVICP Sub-System

• HDVICP is a standalone multi-format High Definition video encoding/decoding hardware engine.

• Supports encode/decode performance of 1080p60 and greater
  – H.264 1080p @ >60fps video processing
    • 1080p30 + D1 30fps (A8 600MHz)
    • 1080p at 66fps (A8 720MHz)
    • **Noise filter ON for all use cases**
  – Flexibility / multi-streaming
  – Hi Megapixel @ 120Mp/s
  – 10Mp @12fps / 12Mp @ 10 fps
  – Multiple video codec capable: MJPEG, MPEG4, MPEG2, VC1 & others

• HDVICP contains hardware accelerators:
  – Motion estimation & compensation accelerators
  – Loop filter accelerator
  – Intra-prediction accelerator
  – Entropy coder/decoder
  – Calculation engine

• **HDVICP contains several control and DMA blocks to limit need for load on system processors (ARM/DSP)**
Multi-format support

- **TI free codecs:**
  - H.264 BP/MP/HP Encode/Decode
  - JPEG/MJPEG Encode/Decode,
  - MPEG4 SP/ASP and H.263 P0/P3 Decode,
  - MPEG4 SP/H.263 P0 Encode
  - MPEG2 SP/MP Decode,
  - AAC LC/HE Encode/Decode, MP3 Decode

- H.264 Enc/Dec Beta – 2Q2011, GA – 4Q11

- Other Codecs: 3Q11/4Q Beta – **Phased release**

- 3P: Ittiam (SVC Encode/Decode) and Sasken
## DaVinci Decode Capabilities and SW Codecs

<table>
<thead>
<tr>
<th></th>
<th>MPEG2</th>
<th></th>
<th>MPEG4</th>
<th></th>
<th>H.264</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D1</td>
<td>720p</td>
<td>1080p</td>
<td>D1</td>
<td>720p</td>
<td>1080p</td>
</tr>
<tr>
<td></td>
<td>30fps</td>
<td>30fps</td>
<td>60fps</td>
<td>30fps</td>
<td>60fps</td>
<td>60fps</td>
</tr>
<tr>
<td><strong>DM355</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARM9</td>
<td>A=135MHz</td>
<td></td>
<td></td>
<td>1</td>
<td>SP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A=216MHz OR 270MHz</td>
<td></td>
<td></td>
<td>3</td>
<td>SP</td>
<td>1</td>
</tr>
<tr>
<td><strong>DM365</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARM9</td>
<td>A=216MHz</td>
<td>2</td>
<td>MP</td>
<td>1</td>
<td>ASP</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>A=270MHz</td>
<td>3</td>
<td>MP</td>
<td>1</td>
<td>MP</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>A=300MHz</td>
<td>4</td>
<td>MP</td>
<td>2</td>
<td>MP</td>
<td>1</td>
</tr>
<tr>
<td><strong>DM368</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARM9</td>
<td>A=432MHz</td>
<td>4</td>
<td>MP</td>
<td>2</td>
<td>MP</td>
<td>1</td>
</tr>
<tr>
<td><strong>DM385</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A8</td>
<td>A=600MHz</td>
<td>8</td>
<td>MP</td>
<td>3</td>
<td>MP</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>A=720MHz</td>
<td>9</td>
<td>MP</td>
<td>4</td>
<td>MP</td>
<td>2</td>
</tr>
<tr>
<td><strong>DM3730/DM3725</strong></td>
<td>A=800MHz</td>
<td>2</td>
<td>BP</td>
<td>1</td>
<td>MP</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>A=1GHz</td>
<td>2</td>
<td>BP</td>
<td>1</td>
<td>MP</td>
<td>2</td>
</tr>
<tr>
<td><strong>DM6467</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARM9</td>
<td>A=297MHz</td>
<td>8</td>
<td>MP</td>
<td>4</td>
<td>MP</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>A=365MHz</td>
<td>10</td>
<td>MP</td>
<td>5</td>
<td>MP</td>
<td>2</td>
</tr>
<tr>
<td><strong>DM6467T</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARM9</td>
<td>A=500MHz</td>
<td>12</td>
<td>MP</td>
<td>6</td>
<td>MP</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>A=500MHz</td>
<td>12</td>
<td>MP</td>
<td>6</td>
<td>MP</td>
<td>2</td>
</tr>
<tr>
<td><strong>DM8148/DM8147</strong> &amp; <strong>DM8146/DM8166</strong></td>
<td>A=1GHz</td>
<td>16</td>
<td>MP</td>
<td>8</td>
<td>MP</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A=1GHz</td>
<td>16</td>
<td>MP</td>
<td>8</td>
<td>MP</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A=1GHz</td>
<td>16</td>
<td>MP</td>
<td>8</td>
<td>MP</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A=1GHz</td>
<td>16</td>
<td>MP</td>
<td>8</td>
<td>MP</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A=1GHz</td>
<td>16</td>
<td>MP</td>
<td>8</td>
<td>MP</td>
<td>3</td>
</tr>
<tr>
<td><strong>DM8168/DM8167</strong> &amp; <strong>DM8166/DM8167</strong></td>
<td>A=1GHz</td>
<td>29</td>
<td>MP</td>
<td>11</td>
<td>MP</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>A=1GHz</td>
<td>29</td>
<td>MP</td>
<td>11</td>
<td>MP</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>A=1GHz</td>
<td>29</td>
<td>MP</td>
<td>11</td>
<td>MP</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>A=1GHz</td>
<td>29</td>
<td>MP</td>
<td>11</td>
<td>MP</td>
<td>5</td>
</tr>
</tbody>
</table>

^Please see respective codec data sheets (CDS) for complete details & capabilities

* CDS coming soon for DM81xx devices
# DaVinci Processors

## DaVinci Encode Capabilities and SW Codecs

### DM3730/DM3725
- **ARM9**
  - A=135MHz
  - D=100MHz
  - CDS

### DM368
- **ARM9**
  - A=216MHz OR 270MHz

### DM355
- **ARM9**
  - A=600MHz
  - D=800MHz
  - CDS

### DM6467
- **ARM9**
  - A=297MHz/D=594MHz

### DM6467T
- **ARM9**
  - A=500MHz/D=800MHz

### DM814x
- **ARM9**
  - A=1GHz/D=1GHz
  - CDS

### DM816x
- **ARM9**
  - A=1.2GHz/D=1GHz

### DM37xx/DM3x
- **ARM9**
  - A=125MHz

### DM811x
- **ARM9**
  - A=1GHz/D=1GHz

### Links

- **Prod Codec**
  - **DM355**
  - **DM365**
  - **DM368**
  - **DM385**
  - **DM3730**
  - **DM6467**
  - **DM6467T**
  - **DM814x**
  - **DM816x**

## H.264

### DM811x
- **ARM9**
  - A=125MHz

### DM814x
- **ARM9**
  - A=1GHz/D=1GHz

### DM816x
- **ARM9**
  - A=1.2GHz/D=1GHz

## Production

- **DM355**
- **DM365**
- **DM368**
- **DM385**
- **DM3730**
- **DM6467**
- **DM6467T**
- **DM814x**
- **DM816x**

---

*Please see respective codec data sheets (CDS) for complete details & capabilities

*CDS coming soon for DM81xx devices*
VIDEO ANALYTICS
Integrating Entry Level Analytics Reduces System Cost by >50%

Entry level analytics
- People counting
- Trip zone
- Camera tamper
- Intelligent motion detection
- Streaming metadata

Base camera eBOM ~$40*

Analytics SW $50-$100 /ch

DM36x

Analytics card eBOM ~$40*

* : High volume
Headroom available for advanced analytics

Entry level analytics

- People counting
- Trip zone
- Camera tamper
- Intelligent motion detection
- Streaming metadata

DMVA

Base Camera eBOM ~$60*

Advanced analytics

Leading analytics providers

- Analytics SW $50-$100 /ch

DM6435

Analytics card eBOM ~$40*

Object classification
- License plate recognition
- Forensics
- Unattended objects
- Suspicious directional movement
- Crowd formation
- People loitering
- Periods of peak activity
- Duration of transactions

* : High volume

**Image credits:**
- Base Camera eBOM ~$60*: Used with permission from Texas Instruments
- Analytics card eBOM ~$40*: Used with permission from Texas Instruments
- DMVA: Used with permission from Texas Instruments
- DM6435: Used with permission from Texas Instruments
Full flexibility while lessening the TTM

Entry Level
- Video Processing
  - Video Stabilization
  - Face Detection
  - Video Noise Filter
  - 2A + GDRE
- Smart Analytics
  - Object Counting
  - Trip Zone
  - Camera Tamper
  - Intelligent Motion Detection

Advanced
- Vision Library – VLIB
  - In House SW
  - Speed development
  - Increase Perf.
  - Royalty free
- License Technology
  - Analytics SW
  - Analytics VA Card
Vision Co-Processor Performance Examples

Trip Zone

ARM9 Only
90%

With Vision Co-processor
37%

Intelligent Motion Detection

ARM9 Only
33%

With Vision Co-processor
16%

The above results are actual numbers based on each function running solely on the ARM9 and then with ARM9+Vision Co-Processor.
DMVAx Vision Coprocessor enables Smart analytics

- **Object Counting**
  - Video Processing Sub-system
  - Video Coprocessor: H.264, MPEG4, JPEG
  - DMA Data & Configuration Bus
  - Vision Coprocessor 1

- **Intelligent Motion Detection**
  - Video Coprocessor
  - Trip Zone

- **Camera Tamper Detection**
  - ARM Subsystem: ARM9 CPU
  - Peripherals: EMAC 10/100, USB 2.0 HS OTG, System, Serial Interfaces, Program Data Storage

- **Streaming Metadata**
TMS320DM6435 Processor
Optimized Solution for Video Encode

Features
- New C64x+™ Core
  - C64x+™ Core @ 400-700 MHz
- Memory
  - 80 KB L1D, 32 KB L1P Cache/SRAM
  - 128 KB L2 Cache/SRAM
- Peripherals
  - Video Port Sub-System (VPSS): Input (CCDC), Resizer, and Camera Control
  - Two EMIFs: DDR2-266: 32 bits, 133 MHz; EMIF 2.1
  - 10/100 Ethernet MAC, MII or RMII; HPI; McASP
  - VLYNQ™ – Serial Interface to FPGAs
  - UART (2), I²C, SPI, GPIO, PWM (3), CAN (HECC), 64-bit Timers (2)
    • Package: 16×16mm or 23×23mm, 361 Pin, 0.8mm or 376 Pin 1.0mm; Pb-Free Balls
    • Pin Compatible with DM6437/3/1

Benefits
- High-level of application specific integration to reduce system cost

Delta with DM6437
- 1 Dedicated input video port (none in DM6435)
- 1 PCI 32-Bit (33MHz) (none in DM6435)
- 2 McBSP (1 in DM6435)
VLIB speeds video analytics development & increases performance up to 10X

Available now, royalty-free library includes 50+ software kernels

4X–10X pixel processing improvement over standard C code

Provides higher resolution & frame rate

Enables more advanced features

Allows use of lower cost C64x+ DSPs

Accelerates SW porting and reduces development time by 36 man months

PCs to TI's C64x+ DSP core

www.ti.com/vlibrequest
Available now, royalty-free library includes 50+ software kernels

Software stack for an intelligent IP camera

Video Analytics

Differentiation

Moving Object Segmentation

TI’s VLIB

Available now, royalty-free
Get started today with VLIB

**Step 1:** Customers can leverage any C64x/C64x+ based development tool to use VLIB 2.0. For beginners, TI recommends the DM6437 DVDP.

**Step 2:** Get approval from TI. Visit [www.ti.com/vlibrequest](http://www.ti.com/vlibrequest) to fill out contact form.

**Step 3:** Upon approval, download VLIB at no cost and receive:

- Library of 50+ kernels
- Documentation: User’s Guide
- Demo (requires DM6437 DVDP)
- Test scripts

**DM6437 DVDP, $495**

**VLIB available now, royalty-free**
Software components

- OS (Linux, Windows, RTOS)
- Platform support package
- Frameworks
- Codecs
- Demo applications, Test Suites
TI’s Software Architecture Scales

Hardware Complexity (# cores, type cores, peripherals)
TI's Software Development Kits (SDKs) Bring It All Together

TI's Software Development Kits (SDKs) provide all needed components to start embedded systems development

- Operating Systems
- Middleware/Frameworks and Stacks
- Optimized DSP and accelerator components and libraries
- Application examples and demos
- Compatible development environments
Operating Systems (OS) / Board Support Package (BSP)
- Linux®, Android, and WinCE high-level operating systems
- Third-party high-level and real-time OS support also available
Middleware/Frameworks and Stacks Standardize Development

Middleware/Frameworks
- Application specific SW packages that use the underlying services enabled by the OS to enable specific functionality
  - Examples include GStreamer, OpenMax, Qt, Adobe Flash, and browsers.

Protocol and interface stacks
- Industry standard stacks such as USB and TCP/IP
- Application specific stacks such as PROFIBUS, EtherCAT and CAN-bus available from TI as well as TI’s SW partner network
TI DSP and Accelerator Libraries and Components

- TI provides customers with standardized methods to accelerate applications with our DSP & HW co-processors
- These include our DSP BIOS Link and SysLink ARM-DSP communication protocols, our DSP-specific real-time kernel (BIOS), drivers, and frameworks.
- TI also provides numerous optimized Audio/Video codecs and libraries for common applications
Application Software and Demos Help Guide Development

Application Software / Demos
-TI bundles example applications and demos as part of our SDKs to provide a starting point for customer development.
Develop in Your Preferred Environment

Software Development Environments
- For ARM software development, TI includes Code Sourcery’s Sourcery G++™ GCC and GDB tools for Linux and Visual C++ for WinCE development.
- For ARM RTOS applications, developers can use the appropriate third-party IDE or Code Composer Studio™ (CCS) IDE for select RTOS solutions.
- For DSP software development, TI offers CCS.
- JTAG emulators with a variety of PC interfaces, speeds, and prices are available from TI and through TI’s Developer Network.
TI’s Software Development Kits (SDKs) Bring It All Together

TI's Software Development Kits (SDKs) provide all needed components to start embedded systems development
- Operating Systems
- Middleware/Frameworks and Stacks
- Optimized DSP and accelerator components and libraries
- Application examples and demos
- Compatible development environments
TOOLS
## DM Experimenter Tools

### Development Kit Contents:
- Low-cost development tool
- Allows HW expansions and community software content

<table>
<thead>
<tr>
<th>Tool</th>
<th>Part Number</th>
<th>Price</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leopardboard 368</td>
<td>LI-TB02</td>
<td>$149</td>
<td>Arrow, Avnet, Leopard Imaging</td>
</tr>
<tr>
<td>(based on DM368)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leopardboard 365</td>
<td>LI-TB01</td>
<td>$129</td>
<td>Arrow, Avnet, Farnell, Leopard Imaging</td>
</tr>
<tr>
<td>(based on DM365)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For more information about the Leopardboards including community forum support, documentation, software support, available expansions and project ideas, please visit [www.leopardboard.org](http://www.leopardboard.org)

<table>
<thead>
<tr>
<th>Tool</th>
<th>Part Number</th>
<th>Price</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beagleboard</td>
<td>BEAGLE</td>
<td>$149</td>
<td>Digi-Key</td>
</tr>
<tr>
<td>(based on OMAP3530)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beagleboard xM</td>
<td>BEAGLEXM</td>
<td>$179</td>
<td>Digi-Key</td>
</tr>
<tr>
<td>(based on DM3730)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For more information about the Beagleboards including community forum support, documentation, software support, available expansions and project ideas please visit [www.beagleboard.org](http://www.beagleboard.org)

For a full listing of TI experimenter tools, developer tools, reference designs and development kits, please visit [www.designsomething.org](http://www.designsomething.org)
## DM Developer Tools

### Development Kit Contents:
- Eval board & Documentation
- Video, Imaging, Audio, & Speech Codecs. Codec Engine Framework and DSP/BIOS Link
- CCS and Tools
- Support by TI (e2e.ti.com)

<table>
<thead>
<tr>
<th>Tool</th>
<th>Part Number</th>
<th>Price</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM6446 DVEVM</td>
<td>TMDSEVM6446</td>
<td>$2,495</td>
<td>TI</td>
</tr>
<tr>
<td>DM6467T DVEVM</td>
<td>TMDXEVM6467T</td>
<td>$1,995</td>
<td>TI</td>
</tr>
<tr>
<td>DM3730 DVEVM</td>
<td>TMDSEVM3730</td>
<td>$1495</td>
<td>TI</td>
</tr>
<tr>
<td>DM368 DVEVM</td>
<td>TMDXEVM368</td>
<td>$1365</td>
<td>TI</td>
</tr>
<tr>
<td>DM8168 EVM</td>
<td>TMDXEVM8168</td>
<td>$1,995</td>
<td>TI</td>
</tr>
<tr>
<td></td>
<td>(with DDR3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM8148 EVM</td>
<td>TMDXEVM81486</td>
<td>$2249</td>
<td>TI</td>
</tr>
</tbody>
</table>

## Suggested Applications

<table>
<thead>
<tr>
<th>Part Number</th>
<th>TI Processor</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z3-DM355-MOD</td>
<td>DM355</td>
<td>Z3 (turn-key solution)</td>
</tr>
<tr>
<td>Z3-DM365-MOD</td>
<td>DM365</td>
<td>Z3 (turn-key solution)</td>
</tr>
<tr>
<td>Z3-DM368-MOD</td>
<td>DM368</td>
<td>Z3 (turn-key solution)</td>
</tr>
</tbody>
</table>

### How to access:

- Contact TI Partner or click link for more information to buy now
- Module vendor manufactures hardware and provides video application executable

### For a full listing of DM experimenter tools, developer tools, reference designs and development kits, please visit [http://ap-fdsp-swapps.dal.design.ti.com/index.php/The_Demo_Fleet](http://ap-fdsp-swapps.dal.design.ti.com/index.php/The_Demo_Fleet)
## DM Reference Designs and Dev. Kits

### How to access:
- Contact TI Partner or click link for more information to buy now
- Form-factor design plus near production-ready hardware and software to reduce time to market

<table>
<thead>
<tr>
<th>Tool</th>
<th>Part Number</th>
<th>Price</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IP NetCam Reference Designs</strong></td>
<td>DM355IPNC-MT5</td>
<td>$795/$795/$995</td>
<td>Appro (turn-key solution)</td>
</tr>
<tr>
<td>DM355IPNC-MT5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM365IPNC-MT5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM368IPNC-MT5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DVR Reference Designs</strong></td>
<td>DM365DVR-UD1</td>
<td>$895 wo/HDD $1,195 w/HDD</td>
<td>UD Works (turn-key solution)</td>
</tr>
<tr>
<td>DM368DVR-UD1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DM36x Embedded USB Camera Dev Kit</strong></td>
<td>DM368EUCDK</td>
<td>$795</td>
<td>Leopard Imaging (development platform with demo software)</td>
</tr>
<tr>
<td><strong>DM36x Embedded USB Camera Dev Kit</strong></td>
<td>DM368ECDK</td>
<td>$1195</td>
<td>Leopard Imaging (development platform with demo software)</td>
</tr>
<tr>
<td><strong>DM6446 VuNow Digital Media Adapter Reference Design</strong></td>
<td>VN1000HD</td>
<td>$149 module Contact for Ref. Use</td>
<td>Verismo Networks (turn-key solution)</td>
</tr>
<tr>
<td><strong>DM6467 HD Digital Video Processing Board Dev Kit</strong></td>
<td>DVPB-HD</td>
<td>$1095 Board $45 Enclosure</td>
<td>eInfochips (development platform with demo software)</td>
</tr>
<tr>
<td><strong>DM355 PMP Reference Design</strong></td>
<td>PMPR</td>
<td>Contact <a href="mailto:mkt@ittiam.com">mkt@ittiam.com</a></td>
<td>eInfochips (turn-key solution)</td>
</tr>
<tr>
<td>DM365AWIND (for high-volume, wireless projectors only)</td>
<td>DM365AWIND</td>
<td>Contact Ron Nag, TI</td>
<td>AWIND (turn-key solution)</td>
</tr>
</tbody>
</table>

DaVinci™ technology and you...

Live...

Work...

Play...
Thank You!
Demand for interactive video & communications is skyrocketing!

- Video conferencing and Tele-presence systems
- Increasing demand for distance learning
- Medical kiosks aid in lowering insurance claims
- Interactive digital signage
- Social network sites growing >50% year-on-year - NeiselOnline

- Consumers want a high-quality experience with HD resolution/frame rate
- Development costs have been prohibitive for Video Communications
- Video Communications is the next gen Business-to-Consumer channel
TI’s Video Communications technology covers wide range of market segments

- Consumer Telepresence
- Media Phones
- Remote pharmaceutical, customer service kiosks
- Interactive Digital Signage
- Telemedicine
- Video Conferencing
- Airport check-in kiosks
- Distance Learning

Remote pharmaceutical, customer service kiosks

Airport check-in kiosks

Interactive Digital Signage
DaVinci™ VidComm Roadmap
Enterprise Video Communications Portfolio

Device
- Production
- Sampling
- Development
- Concept

Performance

DM644x
ARM9
360MHz, 90nm

DM647x
ARM9
360MHz, 65nm

VCE6467
ARM9
500MHz, 65nm

DM6467T
ARM9
500MHz, 65nm

DM814x
Cortex A8
1GHz, 45nm

DM816x
Cortex A8
1.2GHz, 40nm

DM816x-Next
3- 4kp60 Enc|Dec
1.5- 4kp60 Enc&Dec

- Improved Channel Density
- Higher Application Performance
- More Codec Capabilities
- Lower Power / Channel
- More System Integration

Video Communications Market Trends
DM368 Embedded Communications Dev. Kit (ECDK)

- The ECDK is perfectly suited for video conferencing, Web cameras, video blogging and interactive signage applications.
  - OmniVision native 720p CMOS imager OV9712
  - Built-in advanced video processing: noise filtering, image stabilization, face detection/tracking
  - Complete Linux-based Communication Camera application including free source code, schematics, gerber files
  - Encode up to H.264 HD 1080p at 30fps, MPEG-4 1080p at 25fps or 720p60

DM368 Embedded USB Camera Dev. Kit (EUCDK)

- The EUCDK is intended for camera applications that already have a host processor for decoding of video which includes set-top boxes, digital signage and kiosks.
  - OmniVision native 720p CMOS imager OV9712
  - Built-in advanced video processing: noise filtering, image stabilization, face detection/tracking
  - Complete Linux-based USB Camera application including free source code, schematics, gerber files
  - Encode up to H.264 HD 1080p at 30fps, MPEG-4 1080p at 25fps or 720p60

For more information, visit: http://www.leopardimaging.com
Third Party: Leopard Imaging