

## Market Watch

**Volume 6, Issue 3**  
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### Event/Seminar:

4/12-4/13	VentureOne Summit 2005	SFO, CA
4/18-4/21	NAB 2005	Las Vegas, NV
4/19-4/20	Wireless Ventures 2005	Redwood City, CA
5/11-5/13	Parks Connection 2005	SFO, CA
5/16-5/19	JPMorgan Tech Conference 2005	SFO, CA
5/16-5/19	Gartner IT Expo 2005	SFO, CA
5/18-5/20	E3 Expo 2005	LACC, CA
5/23-5/27	SID 2005	Boston, MA
6/20-6/22	Intertech Flex Display 2005	SFO, CA
6/27-6/30	JavaOne 2005	SFO, CA
7/11-7/15	Semicon West 2005	SFO, CA
8/23-8/24	HDTV Forum 2005	LA, CA
9/20-9/21	Datacenter Venture 2005	SFO, CA
10/04-10/06	ARM Developer Conference 2005	SCCC, CA
10/03-10/06	Photomask 2005	Monterey, CA
11/11-11/12	Consumer Tech Outlook	SFO, CA
12/13-12/14	MicroVentures 2005	SFO, CA

Mar., 2005

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The Digital Video & Multimedia News is targeted at the Digital Video & Semiconductor related industries, including DVD, Digital Camera, Graphics, Display, WLAN and the latest developments and commercial successes with Digital Video products in the marketplace. It looks at the emergence of new technology & manufacturing processes, compares cost and provides insight into the major applications that Digital Video manufacturers are targeting. @copyright, please use this information for internal reference only and not include any subsidiaries or affiliates.

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**Editor Note:**

March was a busy, overlapped but prospective month with 8 conferences:

- . Globalpress eSummit 2005 overlapped with IDF and US FPD.
- . Embedded System 2005 overlapped with Network Ventures and VON.
- . IDC Direction05 overlapped with BladeServer.
- . 2 conferences were out of Bay Area: Semico Summit 2005 in AZ and US FPD in La Jolla.

**GlobalPress eSummit 2005**

**Date: 3/1/2005**  
**By: Benson Chao**

This is the 3<sup>rd</sup> annual conference by GlobalPress, a PR company for international electronics industry, which was held at Monterey Plaza Hotel, CA during 2/28-3/3. Due to a conflict schedule with IDF and US FPD, I only attended on Monday, Tuesday-2 days. With 58 editors from Asia, EU, USA, the below is the summary:

1. 2/28 Keynote: Michel Mayer, CEO-Freescale

- 2004 Revenue= \$5.7b; Transportation/Standard Products= 50%, Computing/NW= 25%, Wireless/Consumer= 25%.  
Claim market share: NPU= 70% with PowerCube, Handset= 15%, Hi-power RF= 65%, Hi-end DSP= 50%.
- Convergence= Standardize common sub-systems (Re-use+ Platform: PM, A/V, Memory, Security)+ Multi-Functionality.
- No specific strategy explanation on convergence trend.

2. Design for Success: R Blake, VP-Altera

- Revenue Growth: 

	2002	2003	2004
	\$712m	\$827m= +16%	\$1,016m= +23%

  
Market Share Trend: 

	0.35u	0.25u	0.13u	90nm
Xilinx=	60%	60%	80%	30%
Altera=	40%	40%	20%	70%
- 2004Q4: Gross Margin= 70% with +4% market share in FPGA.  
Cyclone II= \$0.35 with 7.5m unit shipment, Claim= +60% Vs Spartan3  
Stratix II= 200 DMips, Claim= +39% performance Vs Virtex4  
Learning curve of FPGA: CAGR of \$/LE (Logic Element)= -25% in 1993-2004
- FPGA Market: 

	2003	2007	CAGR	PLD-SAM @SIA
MOS-DSP=	\$6.2b	\$11.6b	+17%	\$6b
MOS-Logic=	\$36.9b	\$53.1b	+9.5%	\$15b
MOS-MPU=	\$27.4b	\$37.0b	+7.8%	\$3b
MOS-MCU=	\$10.0b	\$13.5b	+7.8%	\$3b

3. 65nm Node: IBM/Chartered

- 65nm at Fab7: MPW in 2005Q4 → Pilot in 2006H1 → Process Qualified in 2006Q2 for LP (Low-Power)/2006Q3 for G (Generic) → Product

Qualified in 2006Q3 for LP/2006Q4 for G.

SRAM Cell= 0.625um<sup>2</sup>/0.52um<sup>2</sup> for G, 0.682um<sup>2</sup>/0.54um<sup>2</sup> for LP.

Design Rule+ Spice Models are ready.

STi+ Twin-well+ Tri-gate (18/28/52A)+ Ni-Salicyded N+/P++ Low-K;

Will use Strained-Si but no details can be released.

90nm: Ramp Production in 2005H2.

- Chartered sent 50 engineers to IBM: 30 for 65nm, 20 for 90nm-12" conversion.

Use Process-Exact strategy+ AMD's APM (Automatic Precision Mfg)

#### 4. Wireless Panel:

- Airgo NW: MIMO will be Everywhere due to valuable/limited Spectrum.

Current WALN Market: MIMO has 2% in unit, 8% in revenue

Standard will be completed in 2006.Q3.

Ultra low-power 802.11 (Compatible w/Bluetooth) is in development now,

MIMO+ Ultra-low-power will impact the UWB market, especially the issue of delayed UWB standard.

- Xilinx: demo RocketIO, a NRZ-based serial IF to 10G bps with equalization+ pre-emphasis.

WW WiAX Market: 2003 2009 @iSuppli

(CPE+ Base-Station) \$0.5b \$2.6b

WW Wireless BS Market: 2003 2008

Semi= \$2.7b \$5.6b

FPGA= \$222m \$382m

3G Baseband: HSDPA (Hi-Speed Downlink Packet Access)+ 3GPP-

Turbo Convolution Code (TCC) for CDMA2000+ Random Access

Channel (RACH) for WCDMA+ Searcher.

Wireless Deployment Cost:

CAPex: RNC= 10%+ BS= 22%+ Sites= 43%+ Core-NW= 25%.

OPex: Marketing= 28%+ Billing= 12%+ Adm= 15%+ Interconnect= 9%+  
NW-maintenance= 14%+ Annualized Capital= 16%+ Annualized  
Equipment= 6%.

- All Transaction-based will be used Wireless.

- Marvell claims to have 65% market share of HDD Read-channel IC.

#### 5. Broadcom: Henry Samuelli, Chairman

- uP in everything → Communications in everything.

- WW Market: BB-DSL CM Others DTV-DBS Cable Terrestrial

2005: 125m 50m 25m 80m 50m 15m

2009: 200m 75m 50m 2008= 100m 90m 30m

WW Home NW Market: 2004 2005 2006 2007 2008

34.5m 48.7m 63.6m 80.8m 97.4m

WLAN Market: -- 120m 175m 250m ??

- DVD will be replaced by Media-server or VoD with DRM.

RFID uses for Car-key

- Convergence of Design Methodology (RF+ Analog+ Digital)

Features+ Functions; Devices+ Platform; End-markets.

- Broadcom believes UMTS-based+ 802.11g 4G vs WiMAX, the only company is not interested in WiMAX+ VoIP can impact 4G market for current WLAN vendors.

Broadcom also believes that 10Gbps lifecycle be longer >= 10-20 years.

#### 6. Enabling NG Infrastructure: Bob Bailey, CEO-PMC Sierra

- 1979-1989: TI; 1989-1993: ATTu; 1993 joined PMC.
- Services Evolution with more BW demand:
  - 1995= eMail+ Web-browsing → 2000= VoIP+ Music Download+ JPEG
  - 2005= Video Download+ DTV+ Peer-Peer-Gaming
- Trend: 2<sup>nd</sup> wave of infrastructure “Capital Upgrade” cycle just beginning.
  - NW Packetization+ Voice/Data/Video ISP+ On-line SAN+ SoC+ Digital Consumer+ Wireless+ SW-Content.
- WW Communication Market:
 

	2002	2003	2004	2005E
Equipment=	\$124.5b	\$116.6b	\$129.4b	\$138.6b
ISP=	\$93.4b	\$85.5b	\$95.1b	\$100.8b
Enterprise=	\$31.0b	\$31.1b	\$34.3b	\$37.8b
- WW DSL Subscribers: 35.8m 61.2m 95.7m 130.9m  
(FTTH will limited in Hi-density cities due to higher cost)
- WW BB Subscribers:
 

	2004	2005	2006	2007	2008	2009
	130m	170m	210m	250m	290m	330m
- VoIP Penetration= 5% 12% 20% 29% 36% 45%
- New IC:
  - MSP4000: 4-port VoIP GW= 4x SLIC IF+ 3x MAC+ MIPS32-4km+ 4-way Data Switch+ Voice-engine.

#### 7. Hypertransport: (HT)

- HT is simple than SCI, no coherence but can add SCI.
- New HT AP: Infinipath HTX Card: Pathscale- AP Logic ASIC+ 8 CPU+ MPI  
Latency <1.5us+ 1.8GB/s bi-directional.
- Cray: 12-576 Supercomputer with 1.8us MPI latency+ 8GB/s+ Rapid-Array Interconnect to 24 port
- HT 2.0 Spec:
 

	Current Use	Spec Max
BW=	8GB/s	22.4GB/s
Line-Width=	16b	32b
Clock=	1Ghz	1.4Ghz

#### 8. Airgo NW: (Palo Alto, CA) Greg, CEO

- Founded in 2001.1, raised \$97m with 140 employees for MIMO WALN IC.  
Shipped 3m MIMO IC with 108Mbps @20Mhz BW, proposed to 802.11n standard. (WWise Vs TgN-Sync= Beam Forming w/1 DSP + 2x Tx to 1 Rx+ 1 DSP at receiver site)
- Use 2x DSP+ 2x Tx to 3x Rx+ 3x DSP at receiver site, claim has better coverage with Multi-path:
 

	Data-Rate @	30-Ft	200-Ft
Airgo= (2X)		40Mbps	20Mbps
Standard 802.11a/g=		20Mbps	5Mbps
- MIMO ASP Price= \$172 Vs Standard 802.11a/g= \$72 → 2.5X price

MIMO Roadmap: 2004 2005 2006  
 2X → 4X → 6X

- Wait and see attitude for WiMAX market (the 3<sup>rd</sup> trial for Fixed Wireless)

9. 65/45nm: M Kakuma, Toshiba

- 1981: Waseda-MS, joined Toshiba; 1981-9: SRAM; 1989-90: HP visiting; 1991-6: CMOS; 1992: Waseda-PhD; 1996-2002: RISC; 2002-: SoC

- Scaling cost ratio=  $e^{-0.16x}$ ; B-E= 1.5 years @1-1.5 defects/cm<sup>2</sup>  
 = 2.5 years @2.5 defects/cm<sup>2</sup>

Scaling can be maintained as: 45nm 32nm 22nm 15nm  
 Operating Temp= 400K 350K 280K 230K

→ Need new Material, Structure, Circuit-design.

After yield >50%, 0.8x Shrink or Scaling is effective.

- 65nm- DRAM IO Logic Lg; 45nm- Tox Lg  
 Tox= 6nm 3.5/6nm 1/1.4nm 40nm 0.9nm 28nm  
 SRAM= 0.495um<sup>2</sup> ??  
 DRAM= 0.11um<sup>2</sup> 0.069um<sup>2</sup>

(Toshiba claims 32Mb DRAM yield= 95% @65nm.)

- Manufacturing Strategy: Y0 Y1 Y1.5 Y2 Y3 Y4  
 R/D IC-design Std-IC ASIC-pilot ASSP --  
 COT -- IP NG-R/D  
 Cost= 2X 1.2X -- 0.7X 0.4X 0.25X

10. US CE Market: Jeff Josef, VP-CEA

- US CE Market: 2002 2003 2004 2005E  
 -- -- \$113.5b \$125.7b  
 Digital Ratio= -- -- 55% 58%  
 DVD-R= 0.15m 0.5m 2.4m 3.4m  
 DVR= 0.17m 0.5m 0.9m 1.8m  
 DTV= 2.5m 4.1m 7.3m 22.25m  
 LCD-TV= -- 2.5m 3.8m --  
 PDP= -- 0.5m 1.4m --  
 (1999-2004 total DTV sold= 16.1m)  
 Satellite Radio= -- 1.2m 3.3m 4.8m

- Optimize about WiMAX market.

11. Xilinx:

- News: 2004.6 Virtex4 with 90nm; 2004.9: new Embedded, DSP Div; 2004.10: introduced EasyPath+ XA FPGA for auto; 204.12: shipped 100m Spartan, #2 market share in cPLD;
- Claim PLD Share: 2003 2004  
 Xilinx= 50% 51%  
 Altera= 32% 33% (Very contradictory with Altera data)  
 Clock= 200Mhz Vs 120Mhz of Altera @90nm-6W Power;  
 In-rush Power= -95% average; Chip-size= -28% Vs Altera.
- New ISE7.1 Design SW: Linux-based

Power Analysis+ Hierarchical Design+ Simulation+ In-Si Debug  
Claim +25% faster than ISE6.3

FPGA Synthesis ,market= +75% by 2008

- 65nm FPGA will be taped out in 2005, plan be 1<sup>st</sup> one.

1.5m System-gates-Spartan= \$12.95 (Vs ASIC= <\$5.)

12. Open-Si: An ASIC design services start-up in 2003.

- Design Center in Bangalore, India, claim Design-labor= 1/3; O/H= 1/2 and EDA-Tool efficiency= 3X (??) → Chip-cost= 1.3X+ Schedule= 90% prediction (Vs 20%)+ 1<sup>st</sup>-pass= 72% (Target 90% Vs 31%)
- Focus on 0.18u, 0.13u ASIC design services with OpenModel.

### **Xilinx News Release: 3/1/2005**

- Announce new Spartan3e family with 90nm at UMC for Logic-centric CE market (Spartan3 is for IO-centric CE market) by:
  - . Optimize 90nm transistor design with smaller size.
  - . Reduce to 1-ring pads Vs Stagger-pads IO design.
  - Chip size= -30% with 250k gates (Vs 200k gates of Spartan3)
- Spartan3e Price= <\$2 @ 100k gates= \$0.46/1k logic elements (Vs \$14.5 in 98)
- New AP: LCD-TV: Sharp 20"= ESS-ES6420 Media Processor+ IChips-IP00C720 Scaler+ Mitsubishi-M52347 Sync SP+ ADI-AD9883 Analog IF+ BurrBrown-ADS831 8b ADC+ Rohm-BA7657 Video Switch+ SI9993 HDMI Rx+ NS-DS90385 LVDS Tx+ 2x Xilinx-Spartan 2S50+ Panasonic 2x 8b+ 16b uC.  
LCD Monitor: Spartan3e 3S250 can replace TCon+ uC+ LVDS Tx.
- WW Car Telematics Market: 

	2003	2010	@ABI
	\$5.6b	\$12.8b	
FPGA IC=	\$240m	\$449m	
- UMC= 99% Xilinx foundry supplier in 2005Q1.

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### **US FPD Conference 2005**

**Date: 3/5/2005**  
**By: Yuan Chao**

This is the 7<sup>th</sup> annual FPD event hosted by DisplaySearch at Hilton, La Jolla on 3/1-3/3, due to the conflict with eSummit 2005, I only attended on 3/2-3/3. With 350 attendees, it shows a great interest in FPD this year. The below is the summary:

#### **Executive Summary:**

- TV Size Trend: Based on reasonable TV size gap, the TV Size trend shall be:  
20" → 26" → 32" → 40/42" → 50/52" → >60"  
6"    6"    8-10"    10"    10"  
36" and 46" TV will be in an unfavorable position in TV market, this is be considered into TFT G7 planning. From LCD panel viewpoint, G7

utilization (46"= 90% at 6-up, 40"= 91% at 8-up; 32"= 86% at 12-up )  
 better than G6 utilization (32"= 84% at 8-up; 37"= 86% at 6-up

→ Taiwan shall consider to skip G6, direct into G7 fab.

- a-Si TFT Production:

Ink-jet based Color Filter (CF) in house production.

5 → 4 masks design+ production.

1. Attendee Analysis:

- #1: Corning= 20, #2: Samsung= 17, #3: LG= 12, #4: 3M= 10, #5: HP= 9.
- IC Vendor: ADI= 5, Intel/Qualcomm/Maxim= 3, Si Image/Si Optix/Genesis/CMD/MicroSemi= 2, Conexant/NS/nVidia= 1.
- Japan: Toshiba= 6, Sony= 4, NEC-Mitsubishi=4, Sharp= 3, Panasonic= 2.
- Taiwan: Syntex= 4, EnVision= 3, Tatung/AUO= 2, ITRI/Picvue/CMO/Vastview/Well-power/BenQ/RiTdisplay= 1. (China: SVA=1.)

2. WW Market:	2004	2005	2006	2007	2008	2009	CAGR
- Monitor:	133m	145m	150m	156m	166m	177.5m	+5.7%
CRT=	64m	48m	33m	28m	23m	19m	-23%
LCD=	69m	97m	117m	128m	143m	156.5m	+13%
- Handset:	629m	661m	701m	783m	844m	886m	+7%
New User=	201m	174m	144m	123m	--	--	
OLED=	--	1%	2%	5%	9%	--	
TFT=	26%	32%	43%	47%	51%	--	
LTPS=	10%	10%	12%	16%	14%	--	

- LCD Glass: 2004= 500m ft<sup>2</sup>= +58%; CAGR= +40% from 2004-07 @Corning

Penetration:	2004	2007	Screen-size	CAGR
Notebook=	46m=28%	35%	14.4" → 14.6"	+17%
LCD Monitor=	53%	80%	16.7" → 17.7"	+23%(??)
LCD TV=	5%	21%	20.6" → 27.3"	+97%
Small LCD (Handset/PDA/DSC)=			2.6" → 2.5"	+26%
CRT-TV=	90%	70%		
LCD-TV=	5%	21%		
PDP=	2%	5%		
RPTV=	3%	4%		

3. Handset LTPS Trend: 2004 2005 2006 @Sharp

Resolution=	200ppi	300ppi	350-400ppi
Glass=	0.5mm	0.4mm	0.3mm
Power=	-----→	--→	-50%
Integration=	Scan/Data Driver	Power Ckt	DAC+ TCon Audio+ Sensor
- Sharp Mie Fab2:	P1-2003.6 (2")	P2-2004.3	P3-2004.12
	4m/month	6m/m	6m/m
Tenri Fab1=	2.5m/m		

4. Slim CRT: Philips= 30% CRT TV share= 70m in 2004= #1  
 - CRT TV: Price= >\$1000 \$500-1000 \$250-500 <\$250  
                                   9%          11%          20%          60%  
 - Slim CRT Depth: 21" 29" 32"  
                                   -20% 20cm 35.2cm= -30%

Use rectangular Deflection Yoke.

5. TFT LCD Production: 2004 2005 2006 2007 2008 @AUO-D Su

Korea=	74m	100m	114m	127m	141m
Taiwan=	47m	55m	65m	75m	87m
Japan=	11m	17m	28m	39m	46m

- Taiwan produced 1.8m LCD-TV in 2004= 22% → 40% in 2005.

6. WW DTV Market:

@Samsung

CRT=	4.5m	11m	18m	34m	--
PDP=	3.5m	7.2m	11m	15m	--
LCD-TV=	9m	16m	27m	34m	--
PTV=	5m	6m	6m	6m	--
>35" TV Market:	9.9m	15.6m	22m	31m	
LCD=	0.2m	2m	5m	10m	
PTV=	6.2m	6.4m	6m	6.2m	
PDP=	3.5m	7.2m	11m	15m	
PDP Capacity=	3.8m	7.4m	12m	16.5m	

- PDP Trend: Circuit integration+ Lower Volt  
 42" 4-UP → 42" 6-UP panel production

PDP Capacity:	2004	2005
Samsung=	0.9m	2.0m
LG=	0.8m	1.7m
Matsushida=	0.6m	1.5m

7. WW NB Market: 46m 57m 65m 74m 85m

15-15W" dominates = 58%, 14.1-14W"= 27% in 2007.

Wide NB= 45% in 2007; XGA/wXGA= 84% in 2007.

- Prism Light Guide (LG)= 1.2X efficiency w/lower power+ Thin+ Light  
 = eliminate 2 optical sheets.

Light Efficiency: Inverter= 75% → Lamp= 15% → LG= 60% x 80% →

Cell= 10% → Total= 0.6% (LTPS= 4X density Vs a-Si for Cell)

Tablet PC: use Digitizer between PCB, Back-Lite= Tabless.

**OCB** (Optical self-Compensated Birefringence) Mode= 5ms response time  
 integrated CMOS sensor with LCD= Input Display. @Toshiba

8. Nitto Denko: Optical Film

- Wide View (WV): WV-film → IPS, ASV, MVA, PVA  
 NAF-80u+ NAB-80u Stretching-film → NAF+ 3u Negative C-plate →  
 3u X-plate

#### 9. AMOLED Challenge:

- LTPS grain-size uniformity= <4%+ TFT reliability;
- Yield+ TACT+ Material efficiency.
- Fine Metal Mask (FMM)+ Linear (Vs Point) Sources+ LITI
- RGB direct-pixel OLED → White OLED+ integrated CF.
- Samsung: Super Grain Si (SGS) Crystallization Vs Laser-Annealed LTPS  
Circuit: mirror-type → self-Compensated (= No mirror TFT+ IR-drop  
→ Vth= <5% @1V; IR-drop <0.2%)  
FMM Evaporation → Ink-jet Printing+ Laser Induced Thermal Image

#### 10. Dual Select Diode (DSD) Driver: Scanvue Tech

- DSD Driver: Precision Volt divider by 2 equal non-linear R (TFD= 10x10u SiN)  
Differential ckt for better variation tolerance & accurate gray-scale  
RC delay cancelled out for >40"  
Pixel charging saturates accurately at data volt.
- Offset-Scan-And-Hold (OSAH) driving scheme: Vs= -15V, Vh= -2V  
DSD Driver= Novatek: Separated Select-Line (SL) → Shared SL.  
2-3 Masks Vs 4-5 for TFT.  
No change on display controller+ TCon.
- Driver IC: wXGA: 10x 414-out → 6x 690-out @18V; 0.25u → 0.18u  
wUXGA: 12x 480-out → 8x 720-out  
Narrow Pad-pitch+ new DAC+ Amplifier.

#### 11. Samsung: s-PVA (Patterned-ITO Vertical Alignment)

- Rubbing-less Protrusion-less LC-cell process
- Negative LC+ normally back-mode.
- Multi-domain (=4) + 2 sub-pixel structure → 8 directional LC controlled.
- BBC (Black Band Cycling): 60Hz impulsive driving by inserting black-data  
w/o brightness loss → Less Motion-blur+ Flicker.
- 40" LCD TV adopts LED Back-lite= 40mm thickness+ >90% uniformity+  
C-Gamut >105%+ 13Kq+ 207W @500nits.

#### 12. ADI: Adaptive Digital Line Length Tracking (ADLLT)

- Timing Recovery: Digital Sync Processing + AGC at Video Decoder.
  - Stable Raster Tuning+ better Comb-decoding+ Adaptive Comb-filter
  - IC: AD9880: Dual (RGB+ HDMI) 150Mhz ADC to 1080p  
ADV7402: NTSC/PAL+ 1080i Video Decoder+ 12b 140Mhz ADC  
ADAV400: Audio Processor= 8x 100dB DAC+ 4x 100dB ADC+ Lip Sync  
Compensation+ 4-in/2-out Digital IO (50Khz)+ Audio-core.  
ADAV450: SIF Decoder= ADAV400+ 1 ADC+ SIF Processor+ A-Bypass.
- (Login ID: usfpd2005; PW: attendee)

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#### Market News:

WW HDD Market:

@iSuppli-3/1/05

	2003	2004	2005	2006	2007	2008	CAGR
	259m	304m	334m	364m	409m	462m	+10%
- IT HDD=	230m	271m	288m	307m	337m	373m	+7%
(NB HDD=	45m	54m	60m	68m	79m	90m	+14%
- CE HDD=	20m	33m	46m	57m	72m	89m	+35%
- Server Interface:							
IDE=	10%	9%	4%	3%	1%	0%	
sATA=	2%	13%	20%	25%	28%	29%	
SCSI=	71%	56%	39%	21%	6%	3%	
SAS=	0%	3%	14%	26%	35%	37%	
FC=	17%	19%	23%	25%	30%	31%	
- DT Interface:							
IDE=	85%	70%	55%	40%	25%	10%	
sATA=	15%	30%	45%	60%	75%	90%	

(This sATA has a miss leading data: delay shall >1-2 year)

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**Embedded Systems Conference (ESC) 2005**

**Date: 3/7/2005**  
**By: Meihui Peng**

This is the 17<sup>th</sup> annual event for Embedded Systems Design at Moscone Center, SFO during 3/7-3/10, by a conflict schedule with NW Ventures, I only attended today for Microprocessor Summit, a new 1-day seminar before the formal exhibition on 3/8. ESC 2006 will move back to SJCC, a good news with more easier access in the future.

With 150 attendees for today's Microprocessor Summit at Argent Hotel, the below is the summary:

1. Embedded Processor is a fragmented market: ARM is the winner for Handset; For CE, MIPS looks like will be better than ARM, PPC; For NW, MIPS is even with PPC by basing on today's presentation:
  - 3 IC use MIPS platform: Cradle+ PMC-Sierra+ Cavium.
  - 3 IC use PPC platform: Xilinx+ Freescale-QUICC+ AMCC.
  - 5 IC use proprietary platform: Altera+ Freescale-Starcore+ EZ-Chip+ Intel.
2. Emerging 8b uC market with new ISE, 16b extension, lower power, higher clock, C++, MAC+ CAN+ new IO: like Atmel's 8b+ Flash RISC AVR; Renesas R8C-8/16b CISC+ Flash; Rabbit400 Z80.
3. ARMv7:
  - Architect Roadmap: ARMv4 → ARMv5 → ARMv.6 → ARMv.7
  - CPU Roadmap= ARM7 ARM9 ARM11 Cortex
  - New of ARMv7:
    - For AP-oriented: support MMU+ multi-tasking OS+ Lower power
    - For Real-time: support protected memory+ Lower latency.

For uC: less Gate-count+ deeply Embedded+ Deterministic behavior.

Performance:	ARM7	Cortex
IRQ1 to ISR1-entered=	26-cycles	12-cycles
ISR1-exit to ISR2-entry=	42-cycles	6-cycles
ISR2-return to Interrupt-code=	16-cycles	12-cycles

4. Freescale QUICC: MPC8360e

- PPC-e300 (400Mhz)+ Security-engine+ 2x RISC QUICC(400Mhz) (each has 8x UCC for 8x FE/2x GbE/2x POS-PHY+ 2x SPI)+ 32b-DDR

5. Xilinx: Virtex4 FX

- PPC405 (400Mhz)+ Auxiliary Processing Unit (APU)+ PLB (Processor Local Bus)+ FPU (= XtremeDSP)

FIR-filter Performance:	SW-only	PLB + FPU	APU+ FPU
	2M Flops	22M Flops	45M Flops

6. Dallas 16b uC: MAXQ2000

- Performance: 20 MIPS @20Mhz= 1 MIPS/Mhz= 4 MIPS/mA= 5.1mA @20Mhz
- Peripherals: CAN2.0 Controller+ 12b ADC/DAC+ SPI+ 4x Timer+ HW MAC+ 64kx 16 Flash+ 1kx 16 RAM+ 2x UART+ 112-segment LCD Driver+ RTC.

7. Cradle: multi-DSP CT3600

- 2x 8-RISC GPP+ 16-DSP to 375Mhz for MPEG4 Encoder. Claim better than TI C6415 & DM642 with 50% price.

8. Rabbit4000: 8b uC

- A Z80 compatible 8b uC 75Mhz with 0.18u CMOS+ 3.3V-IO+ 1.8V-Core.
- Rabbit2000= 5V, 30Mhz → Rabbit3000= 3.3V, 55Mhz → Rabbit4000

9. NS: 32b RISC+ DSP

- CPU Bus= 32b @96Mhz= 750MB/s; DSP Bus= 32b @96Mhz+ 2x AHB bus+ 3x AHB Arbiters.

- WW VoIP Shipment:	2005	2006	2007	2008	@In-stat-2004.11
PBX+ Phone=	21m	37m	55m	85m	
WALN+ Handset=	--	5m	40m	125m	

10. AMCC PPC400:

- PPC400= 2 IPC (Instruction Per Cycle) to 800Mhz= 2 MIPS/Mhz+ 128b Bus+ 32b-83Mhz Peripheral Bus+ 2x GbE+ 2x UART+ 2x FE+ TCP Offload (= Checksum Generation/Verification for TCP Header+ TCP-Auto-Segmentation for per-Packet-Tx)+ 32b DDR266= 1,344 MIPS

11. PMC-Sierra: RM9150

- MIPS-core= 2.5W @1Ghz+ 8b HT-600Mhz (= 19.2Gbps)+ 72b DDR-167Mhz (= 21.4Gbps)+ 2x PCI (= 2Gbps Tx/Rx)+ 2x GbE (= 2Gbps Tx/Rx)

<= 400Mhz 128b Internal Fast-Device-Bus (= 51.2Gbps)

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**Network Ventures 2005**

**Date: 3/8/2005**  
**By: Benson Chao**

This is the 13<sup>th</sup> annual VC event on Networking Start-ups by VentureWire/DJ at Sofitel Hotel, Redwood City on 3/8, 3/9, due to the 2<sup>nd</sup> day is SW-oriented Start-ups, I attended today only. With 100 attendees, the below is the summary:

. The technologies of this year NW Start-ups are not disruptive, not attractive; probably by fewer NW innovation in the past few years. It looks like research in university is a good source/connection for innovation.

1. US VC Flow:

	1998	1999	2000	2001	2002	2003	2004
Total Investment=	\$17.9b	\$49.5b	\$94.6b	\$36.2b	\$21.8b	\$18.9b	\$20.4b
NW Investment=	\$3.0b	\$7.8b	\$22.0b	\$10.9b	\$6.1b	\$5.2b	\$4.8b

- NW= 40% of VC investment in IT.

- NW VC Distribution: Connectivity SW= 41%; Management SW= 12%;  
Semiconductor= 12%; Equipment= 11%;  
Connectivity= 10%; Fiber-Optic Equipment= 9%;  
LAN/WAN= 3%; Video= 2%.

- Average Valuation: 1<sup>st</sup>-run= \$4.8m; 2nd-run= \$14.6m; Late-run= \$26.2m.

2. Keynote: **Control Plane (CP) in Multimedia NW:** Nick Bambos, Stanford U

- Handset Target: Battery= 1 week+ Thickness= 1/2+ Display= 2x.

- CP Trend: Power Control= control Tx at lower Interference+ Delay

Session Handoff= Smart Radio+ connect to multi-AP= no Handoff

Task Migration= control server for intensive-computing & client for lite-task to save power. Example= Remote Voice Recognition.

Video over Wireless= control to slow down playback rate at channel -bad, increase playback rate at channel-good for smooth video.

(Looks like there are a lot of works can be studies for wireless control plane.)

3. Enuclia.com: (Beaverton, OR)

- A spin-off from Pixel Works in 2004.12 for FPD-DTV IC; Raised A-\$5.3m with 13 employees. Plan to raise B-\$10m in 2005H2.

- WW FPD Market:

	2004	2005	2006	2007
	13.6m	20.2m	33.6m	42.5m

Integrated DTV-FPD= 1.3m 4.0m 11.7m 21.1m

- Key Tech= VPOE (Video Pipeline Optimized Engine), claim to improve Serial architect (= lower Image quality+ higher BOM cost) w/Matrix/Parallel:

. Claim Chip-size= 50%= \$15 cost/TV

. SoC-based design with 1 OS= Linux as RTOS+ 1 RISC

- Revenue Plan:

	2004	2005	2006	2007	2008
--	------	------	------	------	------

	--	--	\$20m	\$61m	\$159m
Gross Margin=	--	--	55%	50%	52%
Profit=	-\$1m	-\$7m	-\$2m	\$7m	--

B-E= \$26m in 2007H2. (Too aggressive revenue plan w/too optimized GM??)

#### 4. InletHD.com: (Raleigh, NC)

- Founded in 2003.9 for HD Encoder market; Raised \$1.1m with 10 employees. Plan to raise B-\$4m in 2005Q2.
- Focus on VC-1 Encoder market (= 1/3 MPEG2-HD file size) by Add-on Card. HD will have 3 compression standard: VC-1= SMPTE; AVC; MPEG2-HD (I think MPEG-HD will dominate due to existing all the DBS+ CATV + Broadcasters already invested in MPEG2-HD Encoder, just like DVD, can't abandon, so it is a niche player.)
- Key Tech: Optimized Compression Encoding & Analysis (OCEA) on VC-1, by licensing VC-1 from Microsoft and use TI's DSP IC.
- Revenue Plan:

	2004	2005	2006	2007
Revenue	\$0.285m	\$9.5m	\$24.2m	\$37.3m
Profit=	-\$0.6m	\$2.5m	\$4.0m	\$6.7m

#### 5. ReflexPhotonics.com: (Montreal, QC)

- Founded in 2002.9 for optical-based packing/interconnect; Raised Seed-\$1.25m in 2003.7 with 6 employees. Plan to raise A-\$8.5m in 2005
- Optical Interconnect Market:

	2005	2007	2008	2009
Revenue	\$200m	\$1b	\$1.5b	\$2.5b
- Cooperate with McGill University for >5Gbs Board-Board Optical-link+ Chip-Chip Optical-connectivity.  
Key Tech: Parallel Optical BGA-Assy= LD → 45-degree Reflector → Fiber into BGA package; 32 channel= 320Gbs. Claim better than End-coupled/uLens-coupled (Both need Active align+ 90-degree Bend vs just need Passive-align+ 45-degree Bend.)  
Light-On-Board= Wave-Guide+ BGA-Assy  
Comparison: Xbox use LVDS 16-channel @0.8Gbs= 5.12Gbs/cm  
Light-On-Board= 9-channel @0.105cm-width/10Gbs= 857Gbs.
- 1<sup>st</sup> shipment plan= 2005Q4.

#### 6. ElectriPHY.com: (SC, CA)

- Founded in 2003.4 for VDSL IC (symmetric 50Mbps/50Mbps to 150Mbps), raised A-\$9m with 35 employees.
- WW VDSL Market:

	2004	2005	2006	2007	2008
CPE=	4.7m	8.2m	14.0m	22.2m	32.4m-ports
CO=	7.0m	11.2m	17.0m	25.3m	35.7m-port
Revenue=	\$117m	\$165m	\$234m	\$327m	\$440m
- Key Tech: 13/14b ADC-AFE+ 3-4m gates MAC+ DSM (Dynamic Spectrum Management) firmware (can reach longer= 3-6km vs 0-1.5km). Claim Chip-size= -33%, Power= 1.1W/port @52/30Mbps= -30%

G.VDSL= 4-band+ Flex+ Band-0 with RISC core.  
 Foundry= TSMC; 1<sup>st</sup> Si= 2005.3

7. Scintera.com: (SJ, CA)

- Founded in 2001.8 for 10G SP IC; Raised A-\$8.2m in 2001.11+ B-\$9.5m in 2004.1 with 25 employees.
- Key Tech: Analog Signal Processing=1-12Gbs/Ghz (vs ADC+ DSP < 5Gbs).  
 Target Market= Backbone+ Data Center= 300m FDDI MMF.  
 SCN3142 for 10Gbs XFP (Rx+ TIA+ LA+ SCN3142+ CDR) with Adaptive Equalization+ Electronic Dispersion Compensated Engine vs LX4.  
 SCN5028 for 11.5Gbs with 600mW+ 2x distance.  
 Standard Body: T11= FC; IEEE= Enterprise; OIF= Metro

8. LamdaOpticalSystems.com: (Reston, VA)

- Founded in 2003.4 for 10Gb DWDM+ WL-Switch market, raised A-\$5m+ B-\$36m in 2004.11 with 41 employees.
- Metro DWDM Market: 2005= \$1b → 2009= \$1.6b
- Key Tech: GMPLS Control-Plane+ Band-Switching+ 3D MEMS-Switch+ FEC/EDFA Amplifier (= 1,000Km)+ Java-based NW Management SW+ Dispersion Compensation.  
 LN2000 Switch= Replace 7 DWM+ OXC; push OEO to Metro Edge.  
 = 2.5Tb/s= 256 WL/node.

9. GlimmerGlass.com: (Hayward, CA)

- Founded in 2000.3 for 10Gb Fiber Connection Management (FCM) market, raised \$45m with 37 employees. Plan to raise D-\$10m in 2005.
- FCM Benefits: Configuration Cost= -70%+ Efficiency= 4X (2x configuration in 1/2 time)+ Faster Fault-recovery= 10ms.  
 Cisco Example: Productivity= 7X= 3 NW Configuration in 8 weeks → 12 NW Configuration in 5 weeks.
- Key Tech: 3D Si-MEMS Beam-steer Mirror+ Ceramic substrate+ Auto attach  
 Product: Board, Chassis.

- Revenue Plan:

	2004	2005	2006	2007	2008
	\$2.9m	\$10m	\$23m	\$58m	\$95m
GM=	17%	39%	46%	50%	51%

10. MergeOptics.com: (Berlin)

- A spin-off from Infineon Optics when closed in 2000.9 for 10Gb TxRx, raised Seed-e\$0.5m+ A-e\$7.5m+ B-e\$7.5m with 34 employees.
- Key Tech: 10Gb LD Driver+ TIA+ LA+ Licensed 40Gb LD+ PIN from HHI  
 2 Modules: OTx= LD+ LD Driver+ Monitor PD.  
 ORx= PIN+ TIA+ LA (Limiting Amplifier)  
 Sub-mount+ Pigtail building-block.  
 InP Foundry= HHI+ IC Foundry= ST.
- 10Gb Market:  
 Long-haul=                      2004              2008  
    \$206m              \$292m



- WW IP-PBX Lines: 2000 2001 2002 2003 2004 2005 2006 2007  
 0.7m 2m 5m 8.8m 17m 24.6m 32.7m 39.6m  
 WW TDM-PBX Lines= -- -- 39.6m 31.7m 26.2m 22.3m 17.3m 12.7m

2005: IP-based PBX > TDM-based PBX lines.

WW Consumer Services Market:	2004	2008	CAGR
Total Addressable Market=	\$71.7b	\$187.8b	+37%
Content=	\$35.6b	\$88.7b	+35%
End-user AP=	\$15.3b	\$38.5b	+35%
Conference/Collaboration=	\$5.7b	\$13.8b	+34%
Next-G Messaging=	\$11.2b	\$25.9b	+32%
Next-G Telephony=	\$4.0b	\$20.9b	+72%

## 2. VON Industry Perspective: Stewart Alsop, New Enterprise Associates

- 2009 US Market: VoIP= 9m; wVoIP (wireless VoIP= WiFi/WiMAX-based)= 8.5m (ISP: Boingo, SK Earthlink) (I think VoIP market is underestimated)  
 BroadVoice - VoIP services: Unlimited In-State= \$9.95/month,  
 Unlimited World= \$19.95/month → will kill local Bell services.
- **Death to PUC+ Death to Wireline Phone-SP+ Death to 3G-SP**  
**Universal Messaging in 2008=** integrate Wire-line+ Wireless+ email
- Next Google to watch: Jamdat, Lightsurf, Salesforce.com, Advertising.com;  
 VoIP services= Game is over.(Vontage,... etc) will challenge CATV, DBS and local phone services.

## 3. GPON: ITU G.984

- Support 2 framing: ATM+ GEM; Down= 1.244/2.488Gbs, Up= 622/1,244Mbs  
 FSAN can eliminate 3<sup>rd</sup> wavelength at home (Duplex vs Triplex for OTN), support 100Mbs per home with 32-splitter.
- Future: 1 wavelength per home+ multicast PON.
- FEC Standard: → Pro-MPEG COP3= 1/3 error rate.  
 QoS: IP Queuing Modeling+ Per-flow, Per-subscriber.
- Data Rate Trend: Standard Near-term 2-Year  
 MPEG2= 15Mbs 10-12Mbs= 75% 7-10Mbs= 50%
- Channel Change Time: Total= 620ms  
 Remote push= 10ms+ To ADSL-modem= 10ms+  
 Up-link to DSLAM= 50ms+ DSLAM to Packet= 50ms+  
 STB received MPEG-wait for –GOP-to start-display= 500ms  
 Remote Authorization= +1 sec; No IGMP Snooping= + 5sec.
- IP Multimedia Subsystem (IMS) is the future trend with **Layered architect**:  
 Service-Plane w/AP Server → Control-Plane w/Call, Session Control  
 → Transport-Plane.
- SIP (Session IP): 3 Application – Soft SW+ GW+ Session-Boarder-Controller  
 Issue: Need an Uniform+ Certified SIP Platform  
 Inter-Operateability → SIPit (SIP InterOperateability Test) due to  
 implement of Extension, State-machine, Parsing at xx time-frame.

#### 4. VoIP IC Requirement:

- VoIP Migration:
  - 1995: Hybrid Echo= 64ms →
  - 2000: Hybrid Echo= 128ms+ Acoustic-echo-control+ Noise-cancel →
  - 2005: New Voice Compression+ VoIP-over WiFi+ Stereo-Audio-Stream+ Advanced packet-concealment.
- Speech Processing= Acoustic/Hybrid-echo+ Background Noise+ Level-mismatch+ Voice-unintelligent. Voice= 10ms Block-size.  
Protocol Engine= MPLS+ AALx+ IP+ TDM-forwarding  
Wire-line: IP= H.323+ SIP; PSTN= H.324+ T.38 Fax/Modem  
Pocket Processing= Codec-distort+ multi-Trans-coding+ Packet-loss+ Delay+ Jitter+ Low-delay-modem+ WB-coding.  
Protocol Engine= H.248+ SS7+ SIP  
Packet Loss Recovery= 1-3% → 10%
- Hybrid Echo: Round-trip Delay= 45-260ms  
GW → Core-router → VoIP WAN NW → Core-router → GW  
Delay= 16-26ms    5-20ms    5-40ms    5-20ms    16-26ms  
+ TDM-VoIP Trans-coding Delay
- IC Requirement:
  - Efficient Programmability= C-Compiler+ Algorithm-intuitive-architect
  - Standard DSP Library= Voice-compress+Tone-detect+Fax/Modem-delay
  - Programmable data space for multi-Applications
  - Efficient Instruction-set for VoIP algorithm
  - Performance= 50+ MIPS/port+ 100+ ports/IC+ Lower power/cost.
- Octasic.com: (Montreal, QC) New Standard:
  - Voice: G.168= 128ms Line-echo-cancel (in 2006)+ G.169= Automatic Level Control+ G.160= Voice Enhancement Device.
  - Voice-compress; GSM/CDMA/ITU support+ Voice-quality.
  - Packet: AAL2-IP Internetworking+ VoATM (AAL1,2,5+ CAS support)+ CESoIP support (Dynamic Voice Trunk)+ VoIP (IPv6, RTP/UDP)
  - IC Design:                    OPR (Optimized P&R) vs Auto P&R
  - Si Usage=                    85%                    50%
  - Wiring=                    0.01mm                0.08mm @3.8ea X6-X8 gates
  - C=                            11 fP                    56 fP
  - Die-Size=                    14um<sup>2</sup>                    72um<sup>2</sup>
- Freescale:
  - VoIP Trend: Video+ Soft-DSP+ SW-differentiated IP+ Trans-coding (H.263 → H.264 → MPEG4)
  - MSC8211= 4x StarCore SC140 @500Mhz for hi-end AP.
  - MSC711x= integrated RISC+ DSP for low-end AP
  - Japan in design: **Cordless replaced by VoIP+ WiFi phone.**
- RapportIncorporated.com: (Redwood City, CA) SW Configurable Processor:
  - 16x16 8b-PE @100Mhz-0.18u → 32x32 @150Mhz-90nm → 64x64
  - Interleaved Ring-structure+ Global-bus+ IF+ Memory
  - Application: Camera-phone o replace 5 processors- BB, Audio, Graphic

5. wVoIP: IPWireless.com

- TD-CDMA= packet-based UMTS-TDD+ VoIP as 3GPP with shared uplink channel; support 14Mbs+ 140 wireless users or 500 DSL users/cell+ 250 Km/hr mobile users.

UTStarcom licensed IPWireless for TD-CDMA home GW for 3Mbs+ USB to PC + SIM-card. (China+ LG+ Samsung adopt TD-CDMA; NexWave is a TD-CDMA ISP in USA, will impact 3G market.)

Fixed-Wireless Access Price:	\$20-30/month	\$30-40/m	\$40-50/m
Interest %=	70%	35%	20%

- TD-CDMA Chipset: 2004-SoC1 2005-SoC2 2006-SoC3  
(from IPWireless) BBP3 → BBP4 → BBP5

- Security is an issue for VoIP, other New AP:

Voice-mail= Cost+ Interrupt?? Office PC= \$30/day+ Overall IT= \$70/day vs Phone= \$1/day+ LAN= \$1/day+ Mobile-phone= \$2/day  
CTI+ SIP can help voice integration into IT.

Presence= Business necessity is doubtful due to IM is social with buddy list, but not good for business social.

Location= Jambo NW is a good example.

- Value= Simplifying the contacts+ Time control+ Mobility+ Enabling personality management.

- **New Services:** Blended Video+ Voice/Data= TV+ Call#+ Internet.

Interactive Video= Video Surveillance+ Ad/Commerce+ Conference

(This implies TV new features: TV with 2/4 split-screen+ selectable Hide So you can connect TV to Internet show 2 screens, 1 for TV+ 1 for Internet; Remote also can do PVR function for each 2-4 screens.)

- Japan: FTTH Target= 10m homes in 2007

ADSL= 23.3m subscribers in 2004E, will be peaked in 2006H1, then decline to 10m in 2007 due to FTTH.



**Semico Summit 2005**

**Date: 3/18/2005**  
**By: Benson Chao**

This is the 8<sup>th</sup> annual Semiconductor Executives event by Semico at Sheraton Wild Horse Pass Hotel-Chandler, AZ on 3/14-3/15; With 150 attendees, the below is the summary:

. Semi Market Outlook:

Semico is more optimistic for the IC growth in 2006-2008 with CAGR= +16% after -3.4% downturn in 2005. However, most Japanese companies are more conservative regarding the semi maturity: maybe just <= +10% growth in the future.

1. 3/14 Keynote:

- 1) Semico: Jim Feldhan, CEO-Semico

- . Inflection Point Index (IPI) is 9 months leading earlier than Semi market:

	IPI-peak 2004.3	Semi-peak 2004.12	IPI-bottom 2005.1	Semi-peak 2005.10(E)	
WW Semi Market:		2005	2006	2007	2008
		\$210b	\$230b	\$285b	\$345b
. WW Market Forecast:		2004	2005	2007	Growth
Total PC=		187m	202m	262m	+14%
Notebook=		50m	58m	100m	+31%
DT PC=		121m	127m	147m	+7.5%
Cell-Phone=		660m	709m	920m	+14%
DSC=		81m	100m	130m	+14%
WiFi-Access Point=		14m	20m	50m	+58%
MP3=		13m	20m	50m	+58%
DVR=		11m	23m	55m	+55%

## 2) Semi Industry vs Wal-Mart: W Corrigan, CEO-LSI Logic

- . 2004: Semi market= \$214b vs Wal-Mart= \$285b revenue.

Wal-Mart profit= USA Film industry revenue.

Wal-Mart CAGR= +10.5% in 2004-2011 vs Semi= +16.1%; Semi will catch up Wal-Mart revenue in 2011.

Semi Market: Started with Government (1966= 80% semi market) →

Corporate > Government in 1969 → Consumer > Government in 1973 →

Corporate= 65-70%+ Consumer= 25-30% semi market (1980-1990)→

Consumer > Corporate in 2004.

- . Market Concept: **Old becomes News again**

Radio → MP3; CRT-TV → FPD+ PVR; VCR → DVD.

. 3 New Electronics Country:	India	East-Europe	China
2010 eProduction=	\$19.1b	\$54.9b	\$582.5b
Domestic Market=	80%	70%	50%

## 2. 3/14 Keynote: M Mayer, CEO-Freescale

- . A not interested presentation again (vs Globalpress Summit 2005), just introduced Freescale and a common sense on Embedded Semi Trend.

## 3. Wireless Panel:

### 1) Ubicom: D Spreng, CEO

- . Digital Home= WLAN+ Intelligent Stream Handling (= Identify+ Classify+ Prioritize with Link-fragmentation+ Uplink Traffic-shaping+ min-delay+ RTP-based traffic+ Stream-buffering.)

### 2) QuickLogic: T Hart, CEO

. WW WiFi Market:	2004	2005	2006	2007	2008	2009	CAGR
PCbased=	60m	80m	115m	155m	205m	270m	+35%
NB=	35m	45m	60m	75m	90m	110m	+29%
AP=	15m	25m	25m	50m	75m	100m	+41%
DT=	10m	10m	30m	30m	40m	60m	+56%
<b>Non-PCI=</b>	--	20m	40m	105m	180m	280m	+120%

CE=	--	--	--	30m	70m	125m
C-fone=	--	--	--	60m	80m	105m

3) Atheros: W McFarland, CEO

- . 802.11n (MIMO)= Beam-Forming+ Max-Ratio-Combining+ 40Mhz BW can provide the best performance vs 20Mhz BW. (Longer range vs Spatial Mux method.)
- . Timeline: Early-draft in 2005.E → Later-draft in 2006.M → Draft sent to ExecCom in 2006.11 → Standard Publication in 2007.3

4. Semi-IP Panel:

1) Mentor: W Rhines, CEO

- . Semi-IP Market Growth:
 

	2000	2001	2002	2003	2004
Foundry-related Sales=	\$1.7b	\$1.1b	\$1.2b	\$1.4b	\$2.0b
Semi-IP Revenue=	\$762m	\$720m	\$890m	\$1.1b	\$1.4b
- . EDA vendors will win the Semi-IP market with better IP quality+ support+ tools + lower integration-cost for Standard-based Peripheral IP.

2) Innovative Si: M Jones, CEO

- . Z-RAM: 1/2 - 1/5 size for embedded Memory

3) MIPS: J Bourgoin, CEO

- . uP Core License: Time-To-Production= 3 years  
ASSP Design-To-Production= 2 years, quicker than uP core.

5. Automotive Panel:

1) Freescale: P Grimme, SVP-TSPG

- . Building Block Trend:
  - Sensor= Pressure sensor/Accelerator → Tire pressure monitor/gyro/radar
  - uP= 8b CPU (20k Tx) → 32b MPC5554 (34m Tx)+ 2MB Flash
  - NW= Low-speed proprietary J1850 → FlexRay fault-tolerant NW
  - Smart Power= Relay → eXtreme Switch
  - Reliability= < 20ppm → Only zero= acceptable
- . WW Auto-Semi Mkt:
 

	N-America	Japan	Europe	S-Korea	China	ROW
2003=	\$4485m	\$2588m	\$5164m	\$672m	\$403m	\$552m
2008=	\$6785m	\$3259m	\$8106m	\$987m	\$1086m	\$1287m

 CAGR= +8-10% during 2003-2008.

2) Bosch: Dr. Claus Schmidt, SVP-Semi Eng

- . Trend= Distributed+ Intelligence  
ECU (Engine Control Unit): CAGR= +3% to 2020 with 70-75% saturation 0-milage failure.
- . Auto-Semi Mkt:
 

	2004	2005	2006	2007	2008	2009	2010	2011
	\$17b	\$18.4b	\$20.4b	\$22.1b	\$24.1b	\$26.2b	\$28.6b	\$31.3b

3) Infineon: Dr. R Ploss, SVP

- . Electronics in Auto:
 

	2000	2002	2007	2010
Electronics Value=	22%	--	--	37%
Semi Content/Car=	\$200	--	--	\$300
Infotainment=	--	\$2.7b	\$3.9b	--
Safety=	--	\$3.8b	\$6.4b	--

Body= -- \$2.9b \$4.6b --  
 Power-Train= -- \$3.2b \$3.8b --

- . Trend: Global Chassis Control to replace local control Distributed System
- SW is more important.
- Quality= Zero Defect.

**Market News:**

1. Sharp 8G-TFT Fab: @DisplayBank-3/15/05

- Panel Size= 2160x2400mm; Phase1= 15k/month in 2006.10
- Phase2= 15k/month in 2007.

2. WW MP3 Market: @iSuppli-3/14/05

	2004	2005	2006	2007	2008	2009	CAGR
	36.8m	58m	80m	102m	119m	132m	+29%
- HDD-based=	9.8m	17m	25m	36m	47m	56m	+42%
MP3 HDD Market=	\$2.2b	--	--	--	--	\$5.7b	+27%
- Flash-based=	27.0m	41m	55m	66m	72m	76m	+23%
- MP3 IC=	\$319m	\$501m	\$675m	\$849m	\$992m	\$1.07b	+27%

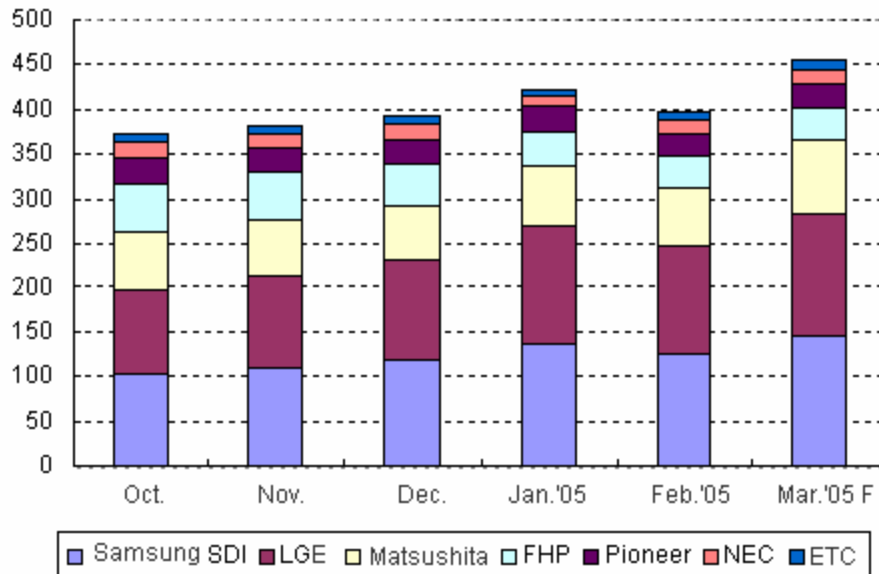
3. WW PDP Market Update: @Displaybank-3/15/05

- 2005Q1= 1.27m, + 11%. (Jan.= 423k, Feb= 396k, Mar. E= 450k)
- (Q1= 18% of yearly PDP market)
- 2005.E= 6.5m.

- WW PDP Market:

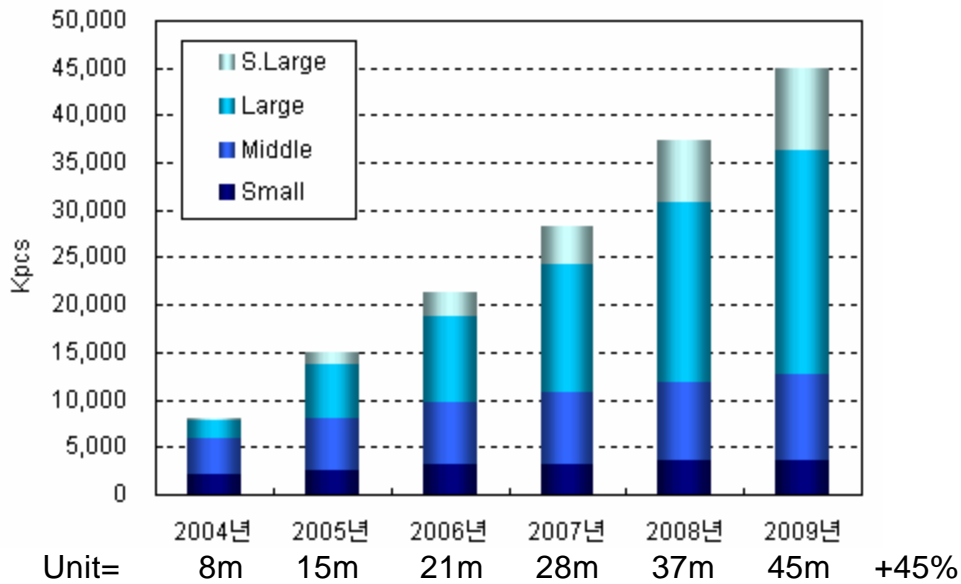
	2003	2004	2005	2006	2007	2008	CAGR
	1.7m	3.5m	6.5m	9m	11m	13m	+50%

**PDP Panel Shipment by Company (Kpcs)**



4. LCD Market Forecast:

@Displaybank-3/15/05



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**IDC Directions05**

**Date: 3/23/2005**  
**By: Meihui Peng**

This is the 40<sup>th</sup> annual event on IT Directions by IDC at San Jose Convention Center today, the slogan is “Blueprint for the Next Decade”, with 1200 attendees , the below is the summary:

**Executive Summary:**

- . Who control the services will win the IT & Consumer market in the future:  
 Financial Services, Communication Services (Wired, Wireless), Internet Services, Customer/Health-care Services, Market-intelligence Services ....etc
- . Consumer Expenditure (CE) will play more and more important on GDP:  
 USA CE= 62% GDP in 1970 → 70% in 2004.  
 That is why Consumer Electronics becomes #1 market for Semiconductor.
- . USA will be in Economic Crisis:  
 Higher oil price w/weak US\$ → International Society will decrease the currency on US\$.  
 Hi-level trade deficit+ more Mature economics → Stock market is not attractive for International investors.  
 → More weaken US\$, weaken Economics. (USA needs to serious reduce Trade Deficit+ Resource-Usage, otherwise economics future is doubtful)

1. John Gantz: Chief Research Officer

- WW 2005 GDP= +3% growth:  
 North America= +3.5%; Latin America= +4.1%; Japan= +1.1%;

- EU= +1.7%; Emerging Countries= +6%.
- IT Replacement Cycle= New-order/Inventory Shipment >1 @2004Q2
- WW IT Spending= 6% in 2005 → 6.5% in 2008  
2005 IT Spending: USA= 5.9%; EU= 5.7%; Japan= 2.3%; Emerging Countries= 10.3%.
- WW Telecom= 5% in 2005 → 4.5% in 2006 → 4% in 2007 → 3.5% in 2008  
2005 Telecom Spending: USA= 1.8%; EU= 3.1%; Japan= 2.4%; Emerging Countries= 11%.
- High Oil Price will hurt IT Spending: EU will adjust from +5% → +3.5%.
- 1995-2005: Internet leads the IT growth → Next is ??
- IT Spending:
 

	Services	SW	HW
1995-2000 CAGR=	+9.3%	+14.2%	+12.2%
2003-2008 CAGR=	+6.2%	+7.0%	+5.9%
- **Differentiate through IT becomes more difficult → Continuous Temporary Advantage= Permanent Advantage.**
- Next Big Things:
  - . China: Industry Output= \$5T in 2004 (> UK) → 2007 (> Germany) → \$15T in 2010 (> Japan= WW#2). 2005      2010      2015
  - . VoIP: Installed Handset=                      50m      250m      1,000m
  - . Mobility: Mobile Devices in Use=            800m      2,500m      5,000m
  - . Broadband: Installation=                      120m      200m      600m
  - . DTV: Installation=                              20m      500m      1,000m
- . **Interoperability Exploding.**
- IT Trend: Consolidation → Dynamic IT

## 2. Digital Home:

- Consumer adopts technology by the **Value= 5C**  
Control+ Convenience+ Community+ Choice/Customization+ Content
- Simplify: Package Right: Home Theater in a Box  
Create intuitive experience: UI on the fly+ AP Interoperability.  
Education+ Promotion.
- Ease/Flex: Portability of content & right.
- Business Model Evolution: ISP to subsidize Acquisition Cost to catch consumer  
→ ISP will play more important role in Consumer market.

## 3. Vertical Market:

- **All Invention happens Vertically, if succeeds → Scale horizontally.**  
Organization shifts from Product-oriented → Industry-oriented. By shifting Organization Structure+ Strategic Planning/Product Development Process

## 4. Dynamic Enterprise:

- Objective: Responsive to the Market+ Operation Efficiency  
→ Business Process Automation+ IT Operation/Automation+ End-to-End Dynamic Management (??)
- IT 4 Technology Principles: Service-oriented Architecture+

Standard-based Components+  
Virtualized resources Model+  
End-End Design/Management.

2 Business Principles: Flex Operating Cost Model+ Flex Sourcing Model

- IT Platform: Information Platform= Federated Data/Information.  
AP Platform= Business Rule+ Functionality → Business Process  
Infrastructure Platform= Virtual-Infrastructure → Vertical Process

#### 5. CE/Wireless IC:

- 2008 CE IC Market= \$25b: Game DTV DSC STB MP3 DVD  
2008 IC Market= \$6b \$7.3b \$4b \$1.9b \$2.1b \$3.7b  
2004-08 CAGR= +34% +42% +2% +2% +13% +11%  
Sony= 12% market share in CE IC= #1, no dominated IC vendors.
- WLAN IC: 2005 2006 2007 2008  
CE Attached-rate= 2% 5% 10% 13%= 81m  
CE= 21% WALN IC market in 2008.
- Handset IC Market: \$25b in 2002 → \$30b in 2005 → \$34b in 2008  
Audio= Polyphonic → MP3 → 3D Audio+ Voice Recognition  
Java: SW Kernel → Co-Processor → Core  
3D: SW → HW-based  
SRAM: replaced by Low-power DRAM or Mobile-DRAM  
Flash: NOR → NAND (NAND-only= 20% in 2008)
- Flash Market: 2004 2008 CAGR  
Flash-Card= 250m 808m +42%  
USB-Flash= 49m 116m +24% (low estimated??)

#### 6. Home Market:

- Trend: Virtual Data= NAS+ Virtualization migrated into Home market.  
Storage from Processing+ Interface from Display+  
**Content Management into Remote.**  
Disaggregated Devices: HW Appliances+ AP as Services.
- **Web Browser into TV.**(Old design into new DTV)  
Streaming Video in Wireless?? Buffering+ Bridging is important.
- Next 5-Years: Extension to current platform+ Connectivity+ On-line  
Next 5-10 Years: **Devices be Network depended.**

#### 7. Wireless CE:

- Wireless Revenue: Voice CAGR= +5% in 2004-08 vs Data= +23%  
Key Multimedia AP:  
Broadbanded Narrowband= Game, Music, MM-information  
Location-based Services.  
MMS+ Video Messaging: (Will displace Camcorder??).  
TV/Video.  
Wireless Community+ MM-Information
- IT Opportunity: Content Management= Storage+ Interoperability.

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This is the 4<sup>th</sup> annual event on Blade Server technologies at Marriott Hotel, Santa Clara on 3/13-14, due to the conflict with IDC Direction05, I only attended today, From market viewpoint, server is a niche and hi-end segment, so this is a small scale exhibition (2006 will move to LA). With 150 attendees for today's keynote, the below is the summary:

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1. WW Blade Server Market:      2003      2004      2009      @IDC  
   \$0.6b      \$1.2b      \$9b  
WW Server Market=              --      \$52b      \$60b
- Gradually gain market share from 2.5% in 2004 → 5% in 2005 → 15% in 2009
  - 2004: Linux= 50%; 2-way= 90%
    - Low utilization of server= 15-20% is an issue → Consolidation
- Server Consolidation Market:      2004      2007      2008  
   \$5b      \$6b      \$6.7b
- Server CAPex: CAGR= +3%
  - OPex: CAGR= +10% → = 73% IT budget in 2008

2. 3/24 Keynote: Ben Williams, VP-AMD Server Div.
- x86 Migration: 8b in 1978 → 16b in 1982 → 32b in 1985 → 64b in 2003  
AMD introduced Direct Connect Architect= 24GB/s+ HT on Opteron64 vs Intel FSB.
- |        |            |     |          |         |        |           |
|--------|------------|-----|----------|---------|--------|-----------|
| Power: | Opteron-EE | HE  | Standard | Xeon-LV | Nocona | Irwindale |
|        | 30W        | 55W | 95W      | 55W     | 111W   | 120W      |
- (Opteron integrates Memory Controller= save 22W more.)
- PowerNow= power saving FW: CPU-load @62% @40% @Idle  
   = -33%                      = -62%                      - 75%
- Server CPU: Longevity= 5 years+ 2-year end-of-life contract.
  - Opteron64 Dual-core  
2 year lead than Intel: Demoed in 2004.6 → Tape-out in 2004.8 →  
Sample in 2005.1 → Shipment in 2005H2

3. Interface:
- 1) Stargen: Advanced Switching Interface (ASI)
- Server Interface shall support Standard+ Legacy+ Future:
    - Legacy: Load/Store= PCI, a shared Register/Gateway IO  
Packets= Ethernet, SCSI, SAS, FC.  
Data Streams= TDM
    - Future: CPU-IO= Mapping+ Separation+ Sharing+ Virtualization+ Decomposition.
  - Stargen supports ASI+ Ethernet IF
- 2) Woven Systems: Distributed Switch
- Switch can't scale with Server → Distributed Switch= More Interconnect Intelligence to the Edge with Multi-path Routing+ Buffering Congestion.

- Desktop Demand behind Enterprise= 10 years  
1994 Enterprise= 1GFlops= 2004 Desktop  
→ 2009 Enterprise= 1,000TFlops
- 3) QLogic: iSCSI
  - Enterprise Storage= Block-level= FC vs SMB Storage= File-level= iSCSI  
iSCSI has little impact on Enterprise due to FC-IP existing.
  - iSCSI= 1 net for SAN+ LAN  
Need TOE to improve performance+ reduce CPU loading.
- 4) Broadcom: 2.5Gb Switch Controller
  - NW Convergence: Server (= Computer)+ NW (= Backbone)= Blade Server+  
NW Switch+ Storage Switch+ Cluster Blade+ Mgnt Blade
  - Improve NW performance: Clustering= RDMA plus iSCSI+ TOE  
2.5Gb Switch Controller: sample now; Production in 2005H2. \$35
- 5) Blade Open Spec: IBM+ Intel formed in 2004.9
  - Enterprise Chassis: 7U with 14 slots  
BladeCenter: 8U with 8 slots
  - Define 7 spec: Blade Module, Storage Module, Switch Module (Max 45W),  
Daughter IO Card (Max 10W)
- 6) IT Service Management Forum: ITSMF
  - Capacity Management+ Demand management+ Modeling+ AP Sizing+  
Capacity DB+ Capacity Plan+ Performance Management (Monitoring,  
Analysis, Tuning, Implementing)

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**Market News:**

1. 10GE Market:	2003	2004	2005	2006	@RHK/Fujitsu-3/21/05
- NIC=	2k	5k	22k	48k	
- Switch=	16k	30k	83k	117k	
- SAN=	0	1k	13k	30k	
Total=	18k	36k	118k	195k	

- 2. Fujitsu: MB87Q3070  
12-port 10GE Layer-2 Switch IC with integrated CX4+ XAUI PHY+ Signaling (= Adaptive equalization+ Pre-emphasis)+ Congestion Control (= PAUSE signaling+ Early-discard= 802.3ae).  
Performance= 240Gbs non-blocking; Latency= 450ns= 1/2 of competitors.

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Mar., 2005

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 The Digital Video & Multimedia News is targeted at the Digital Video & Semiconductor related industries, including DVD, Digital Camera, Graphics, Display, WLAN and the latest developments and commercial successes with Digital Video products in the marketplace. It looks at the emergence of new technology & manufacturing processes, compares cost and provides insight into the major applications that Digital Video manufacturers are targeting. @copyright, please use this information for internal reference only and not include any subsidiaries or affiliates.  
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