
Public Information Display (PID) System

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Contents

- Why do we need PID
- PID market analysis
- Current PID technologies
- New PID technologies
- Conclusion

Flat TV market trend

- Flat TV penetrate much faster than expectation
- 2009 onward, flat TV growth slows down

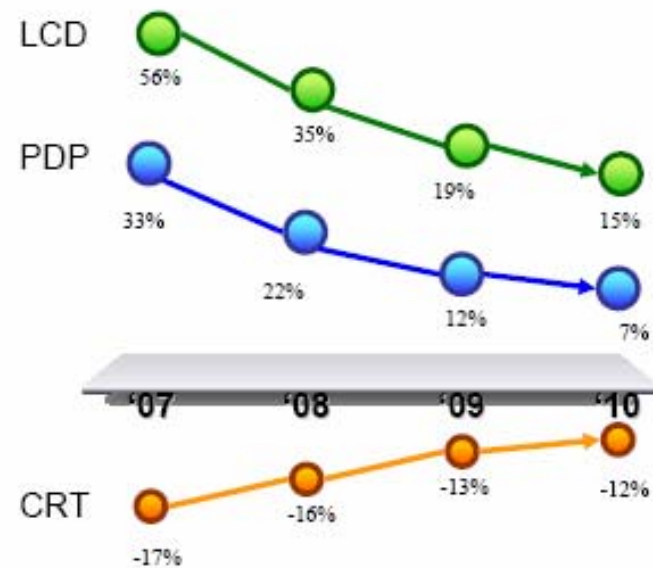
TV market 2006-2010

Million Sets

	'06	'07	'08	'09	'10
Total (Growth Rate)	189	194 (3%)	203 (5%)	210 (4%)	218 (4%)
CRT	130	108 (-17%)	91.2 (-16%)	79.3 (-13%)	70 (-12%)
LCD	44.6	69.7 (56%)	93.8 (35%)	111.6 (19%)	128 (15%)
PDP	9.7	12.9 (33%)	15.7 (22%)	17.6 (12%)	18.9 (7%)
RPTV	4	2.9 (-28%)	2.5 (-14%)	2.2 (-12%)	2.0 (-9%)

Ref DisplaySearch 4Q06 Global TV Shipment

TV market growth 2006-2010



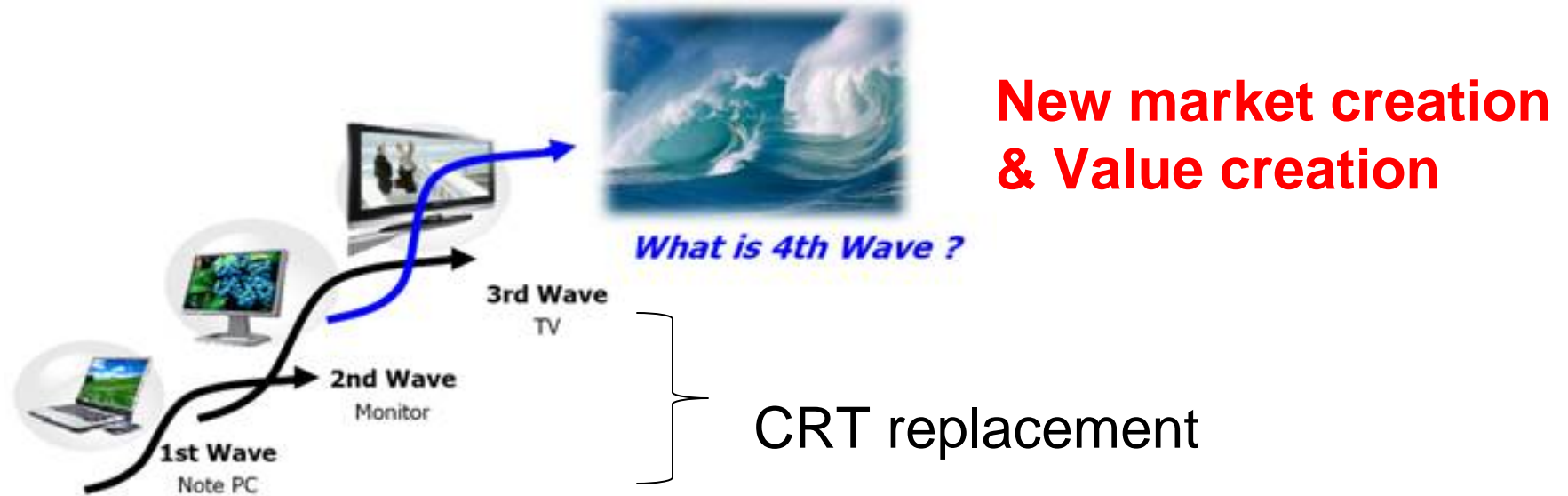
Need new driving force for LCD!

Rapid growth of Flat TV

- ▶ **Severe competition promotes growth**
- ▶ Cost-reduction drives the flat-panel market :
 - ➔ Big volume drives further cost-reduction
- ▶ **Growth is much higher than expected**
- ▶ Are we driving too fast ?
- ▶ **What is the next target after flat-TV ?**



Driving Force of Next Generation LCDs



Public Information Display should be 4th Wave of LCD
— Identified by Sony, Sharp, Samsung, LG, AUO, CMO



New Market Creation – PID

PID: Expand FPD Applications

Transportation

- Airports & Airplanes
- Railway/Bus Terminals
- Trains & Bus

Education

- Applications in universities & colleges & schools

Conference Room

- Be used in conference hall/financial exchanges

Control Room

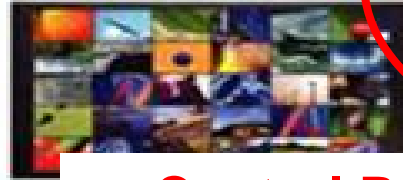
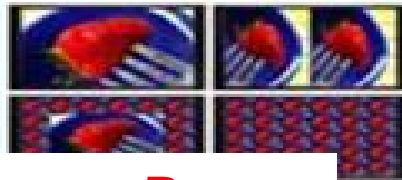
- Military applications
- Simulators for training/entertainment
- CAD/CAM imaging

Digital Signage

- POS displays
- Billboards

Entertainment

- Be used in stadiums & auditoriums & cinemas & convention centers & museums & hotel rooms & casinos



Anytime, Anywhere

Various PIDs



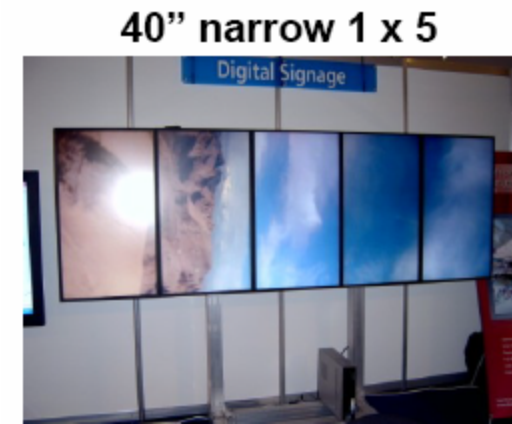
40" narrow 2 x 2



82" outdoor

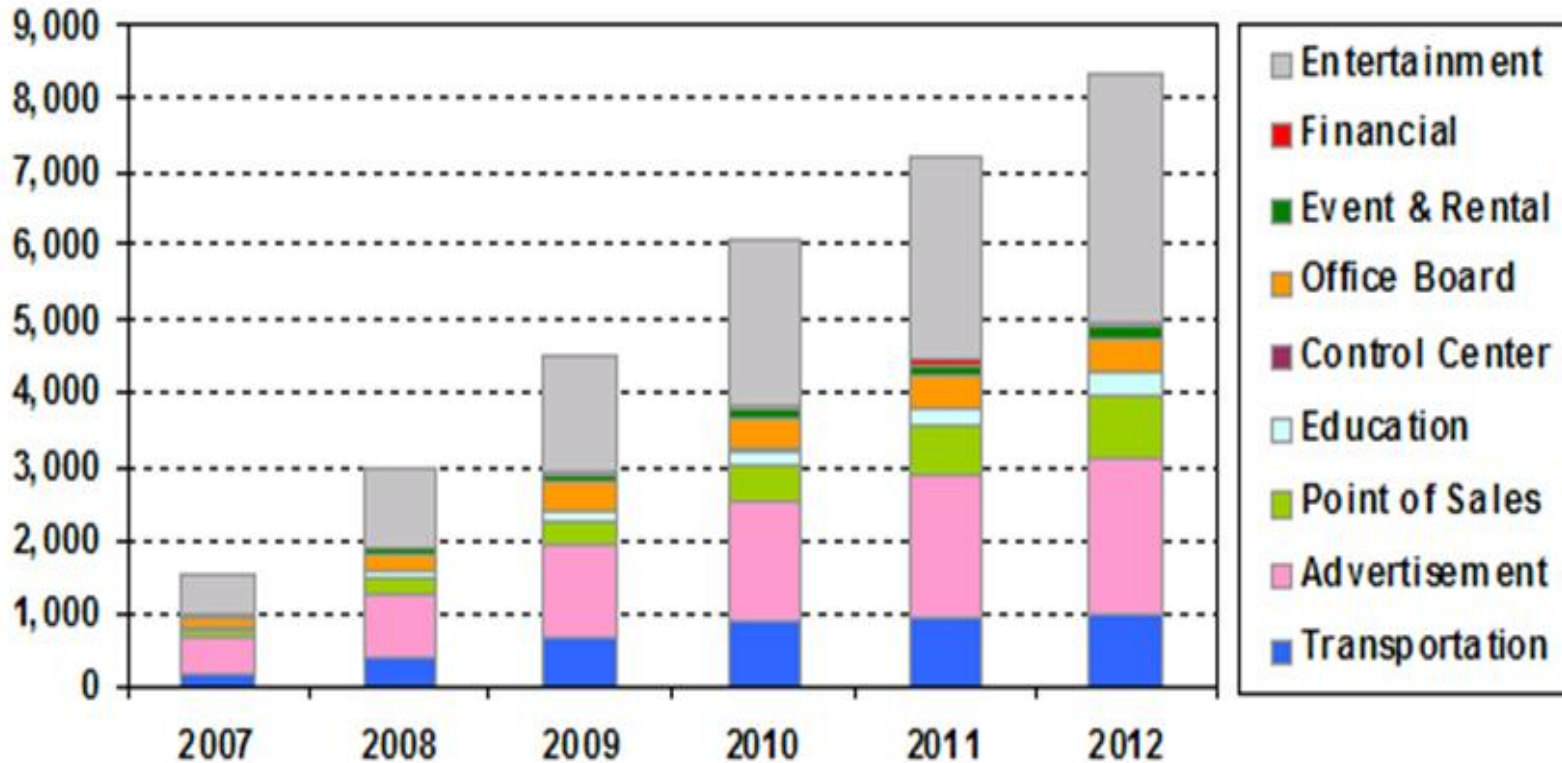


57" & 46"



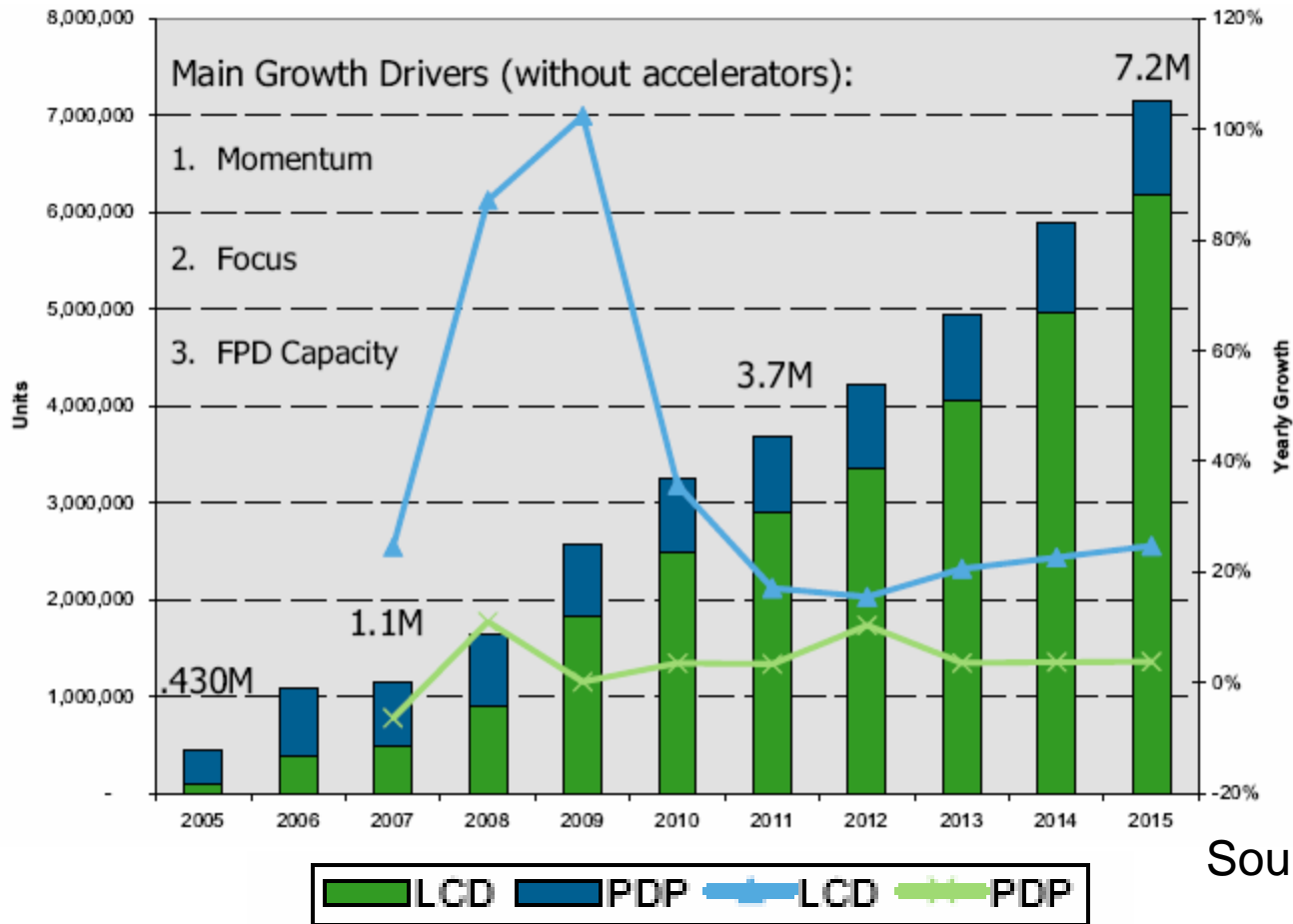
40" narrow 1 x 5

FPD PID Market Forecast



Entertainment, Advertisement, Transportation >75% market share

FPD PID Market Forecast

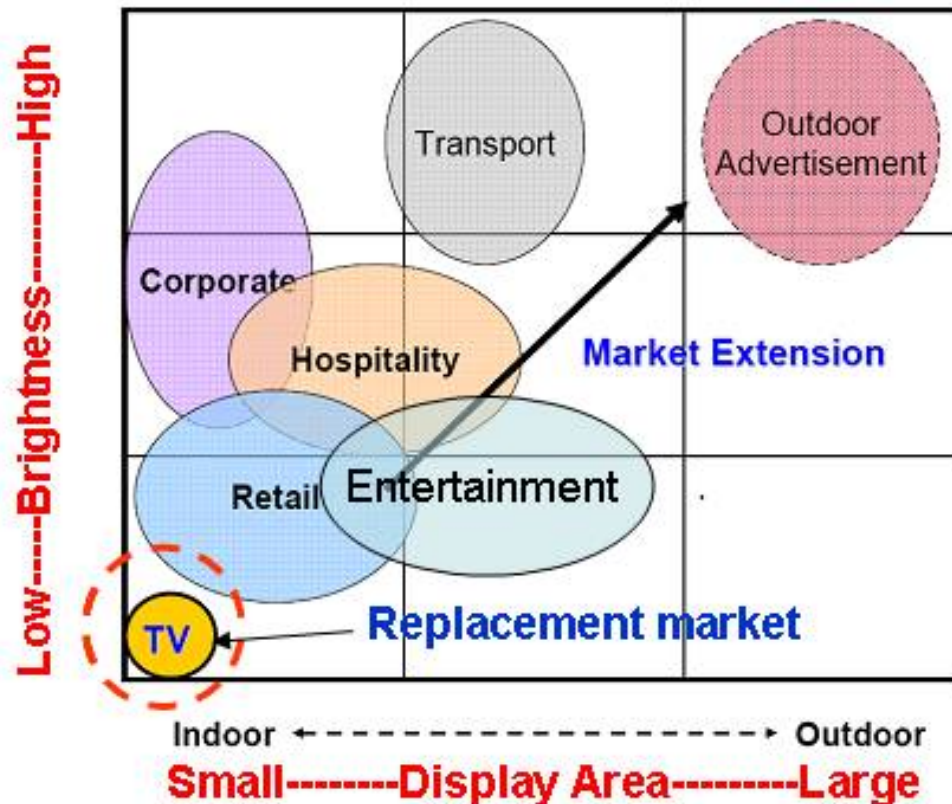


Source: DisplaySearch

LCD will be the dominant technology for PID



Technology for PID



More than a TV!

New technologies platform are needed for PID



Existing PID example



GH Hollywood
PDP PID
103"



Shatin MTR Station
LED Display
~ 1m x5m



Tokyo Piccadilly;
LCD PID
10.4"~82",



Shanghai Street
LED Display

Existing PID Solutions comparison

	PDP	Normal LCD CCFL BLU	LED Display
Brightness	Low (<1000 nits)	Middle (<1500 nits)	High (>5000 nits)
Resolution	High (> Million pixels/m²)	High (>Million pixels/m²)	Very Low (~20-70K pixels/m²)
Power Consumption	Medium	Medium	High
Life Time	Low (Decay)	Low ((HB BLU decay)	High
Cost	Low	Low	Very High
Video System	Simple	Simple	Complicated
Concerns	Burn-in effect	Large gap of tiled display	Maintain & repair cost Complicated structure

High Performance, but low cost PID solution is need!!

The Needs for PID

□ Information Delivering

✓ Multi-viewers simultaneously

Enlarge display area and high brightness

✓ Long operation time

Low power consumption (operation cost)

□ Information Interacting (from Eyes to Hands)

✓ Large size touch sensing screen

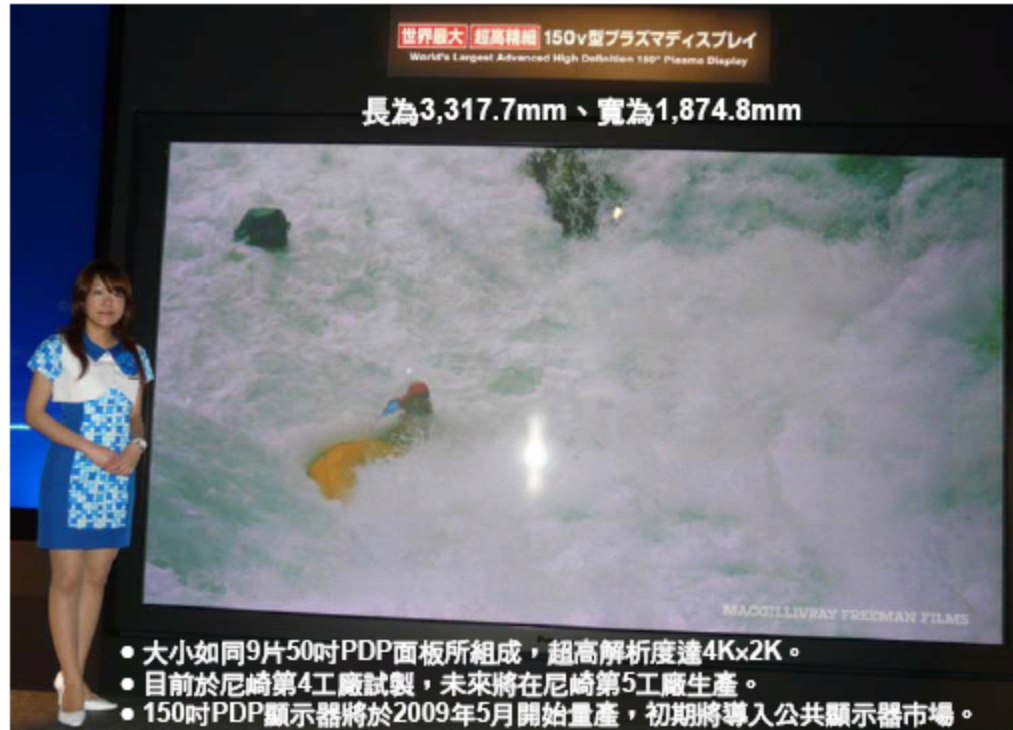
✓ Multi-touch sensing functions

Large Display Area PID

- Single Panel:
- Multi-Panels: Tiled Display
- Double sided Display

Single panel large size PID

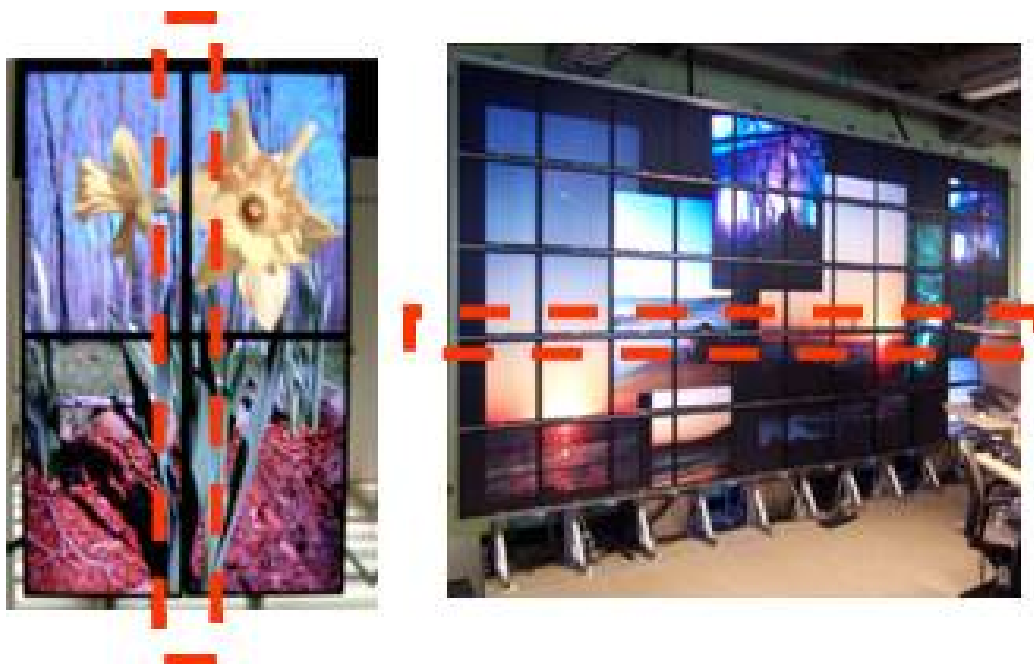
松下電器展示全球最大、150吋PDP顯示器



資料來源：DIGITIMES・2008/4

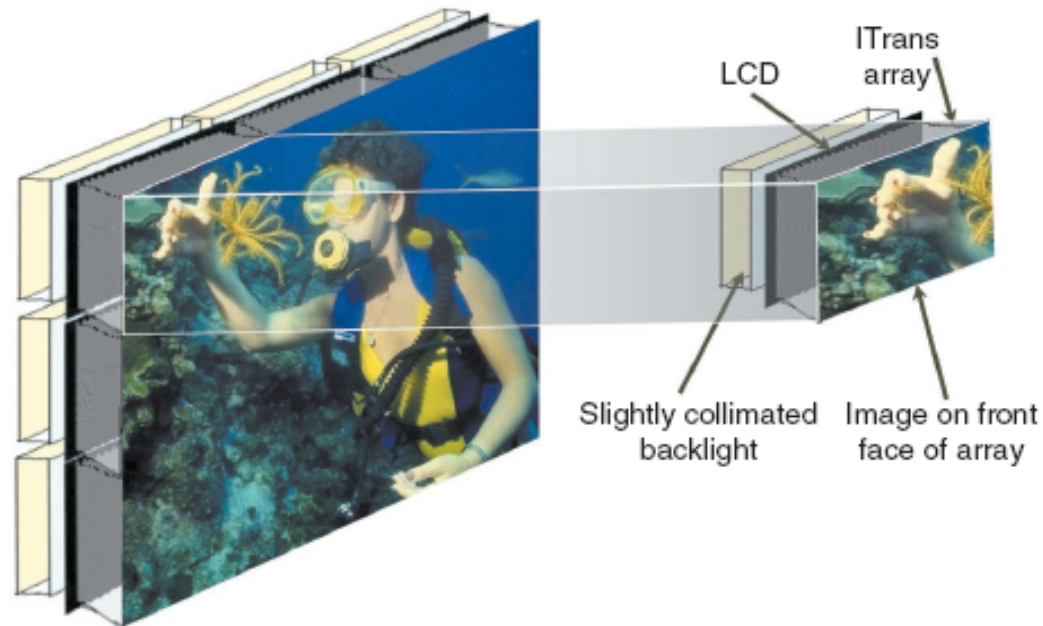
Cost ?!

Multi-Panels: Tiled Display



- Tiling technology enable large display and various W/H ratio.
- Seam (Dead zone) due to LCM bezel is the key issue.
- Novel design is needed to narrow or remove the seam.

LCD tiling technology--Screen technology



- Array of light transmitting guide
 - >30,000 fiber optic elements per module
 - 245mm thick (entire screen)
 - >1mm pixel pitch in first generation,
 - **200" screen with 24 ITrans modules**
 - **High cost!**

Double sided PID



Double LCD Module

Heavy and Bulk



Double sided PID (AUO): CCFL BLU

SID'08

**Single CCFL source for
two LC panels ~ 55mm**

ASTRI's High Brightness Power Saving PID

Technologies included

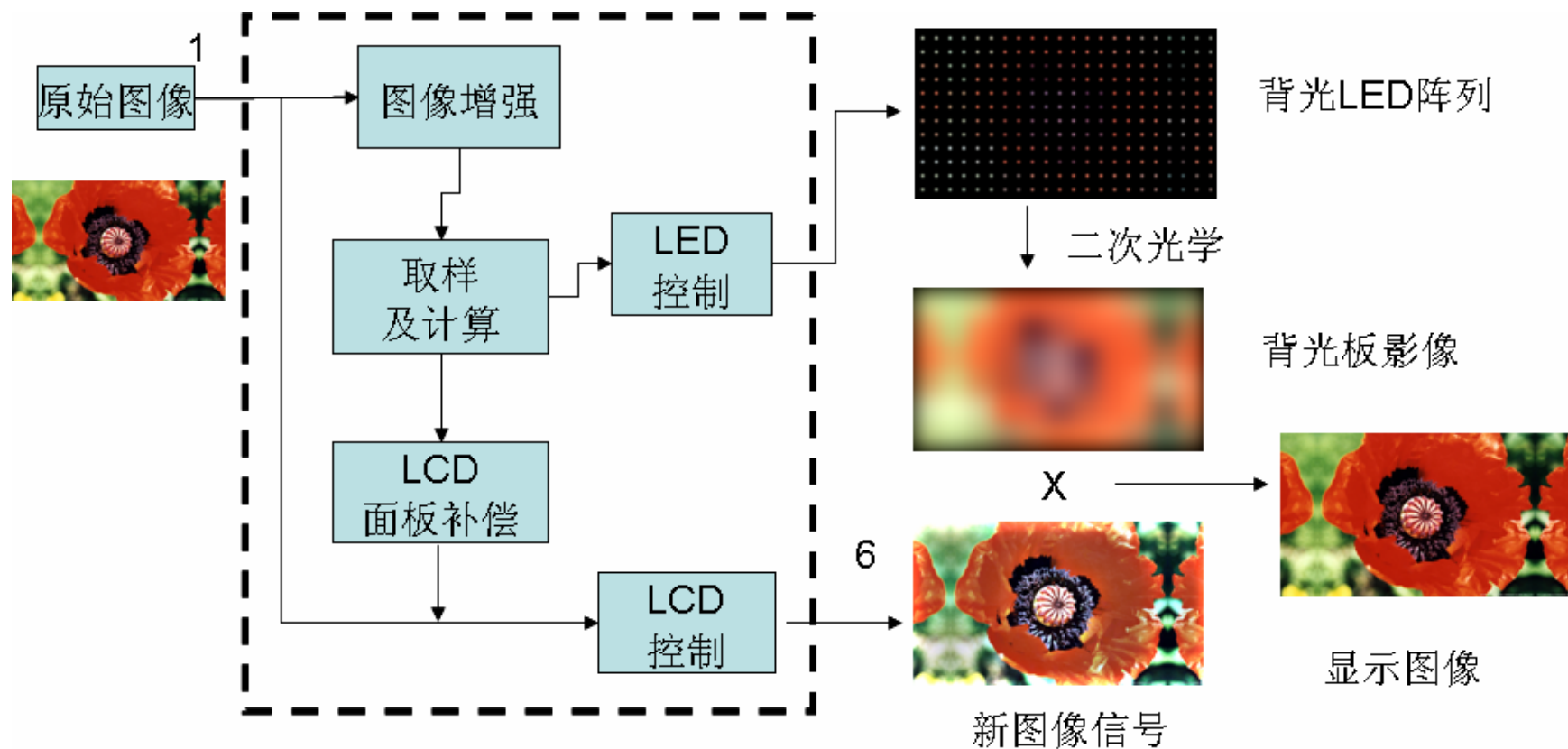
- High power high efficiency LED
 - Suitable for high ambient brightness environment
 - Long life time,
- Active dynamic backlight and image enhancement
 - High contrast,
 - Excellent power saving effect
- System thermal management
 - Low cost FR4 PCB

Specification

- Size : 42 inch, WXGA
- Brightness: 1500~3000 cd/m²
- Power : 50% less than that with CCFL BLU



Active Dynamic Backlight Control



Power Saving

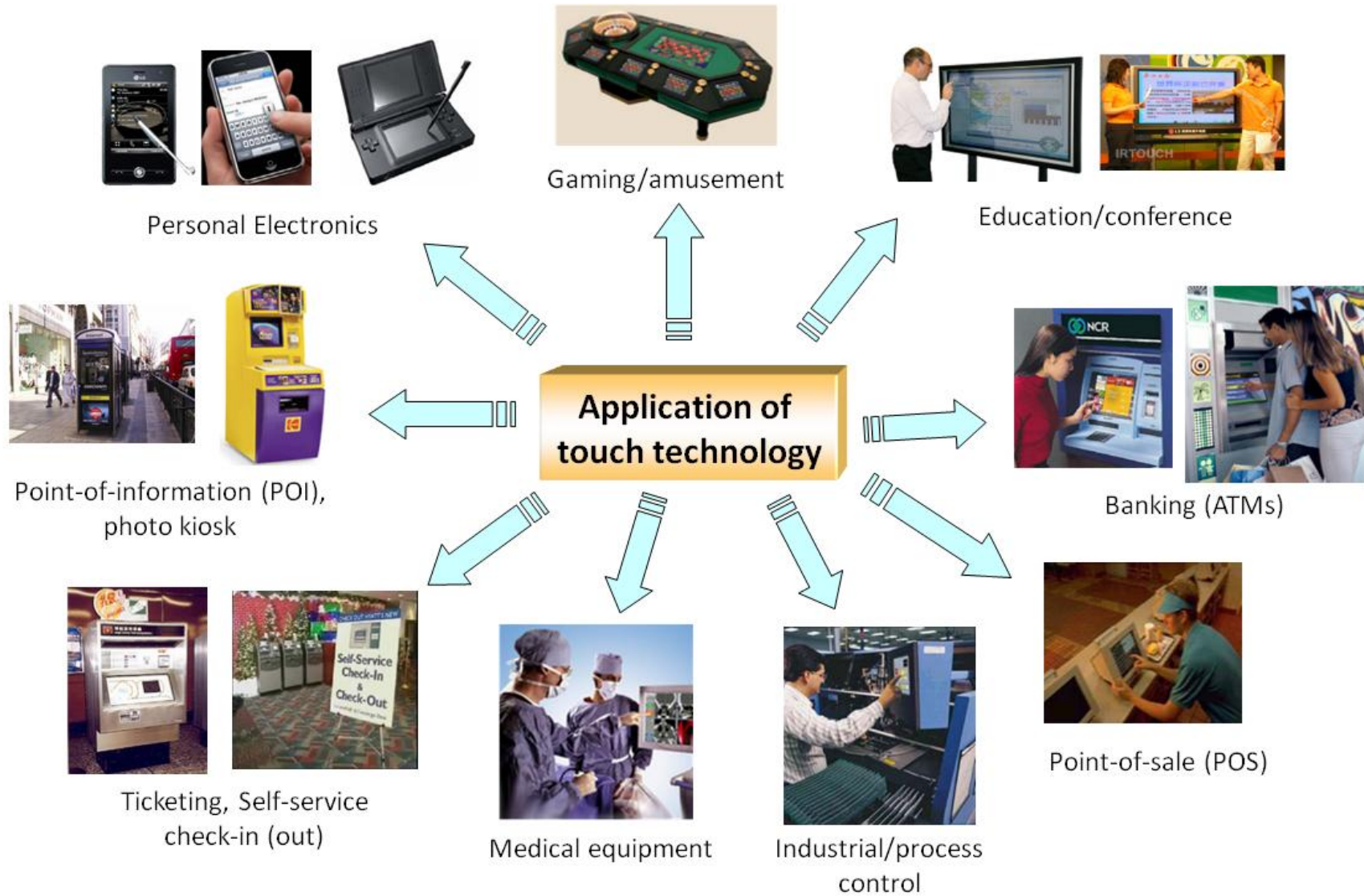


(a) Static LED BLU; (b) dynamic LED BLU, ; (c) Dynamic LED BLU image

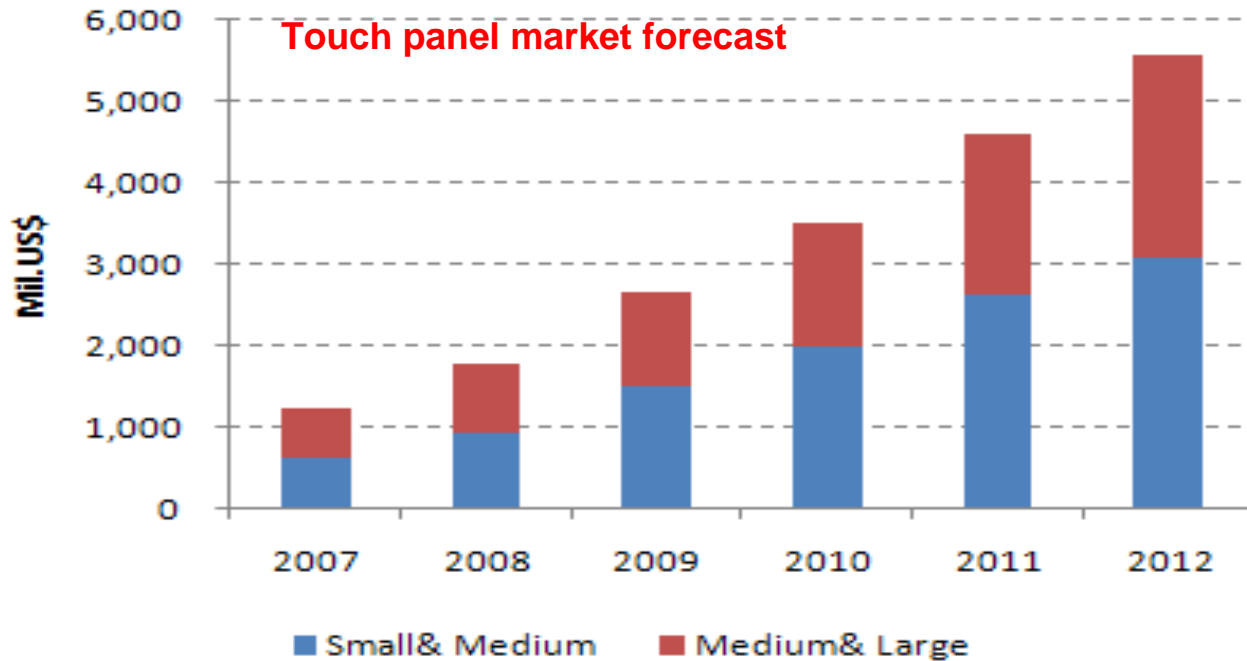
- LED's efficiency $\sim 80\text{lm/W}$, **20%** higher than CCFL
- Dynamic backlight can further save **30%** power than static BLU
- Total **$\sim 50\%$** power saving compared with CCFL

Item		Value	Unit
Size		42 (立式)	Inch
BLU Power	LED (full on)	470	W
	LED (dynamic)	282	W
	CCFL	605	W

Interactive PID– touch screen



Touch Panel Market

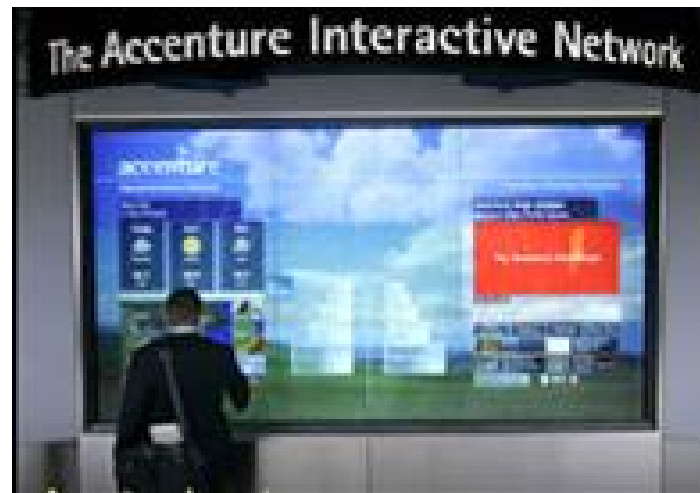


■ Touch panel market: ~ 5.5B US\$ (Y2012)

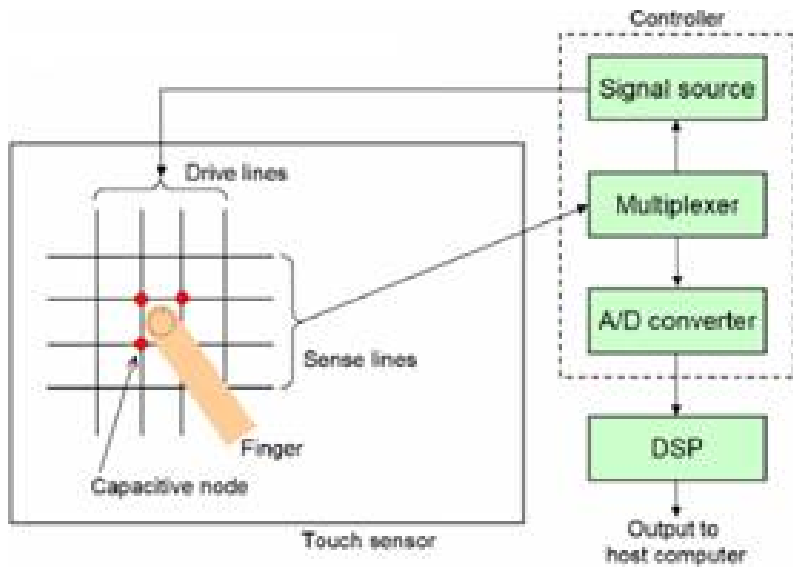
Medium & Large size: 2.5B US\$ (Y2012)

■ Large size LCD touch panel & multi-touch technology in early development stage

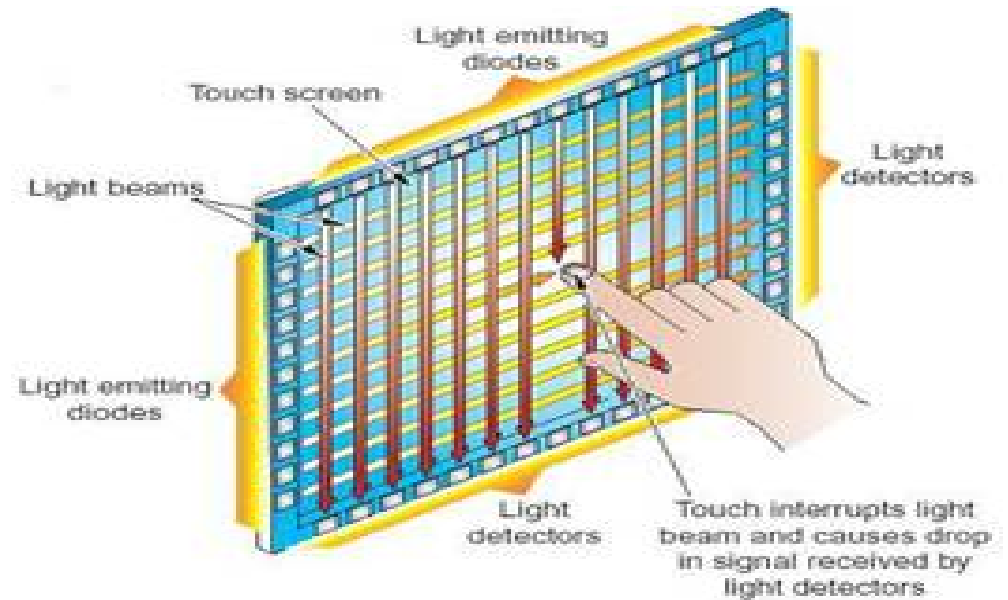
Large size touch Screen



Large Size Touch Screen Technologies (1)

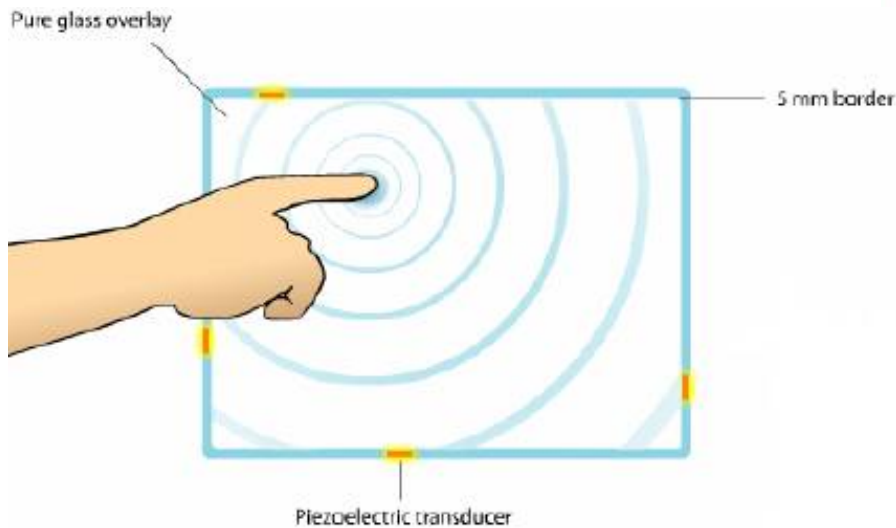
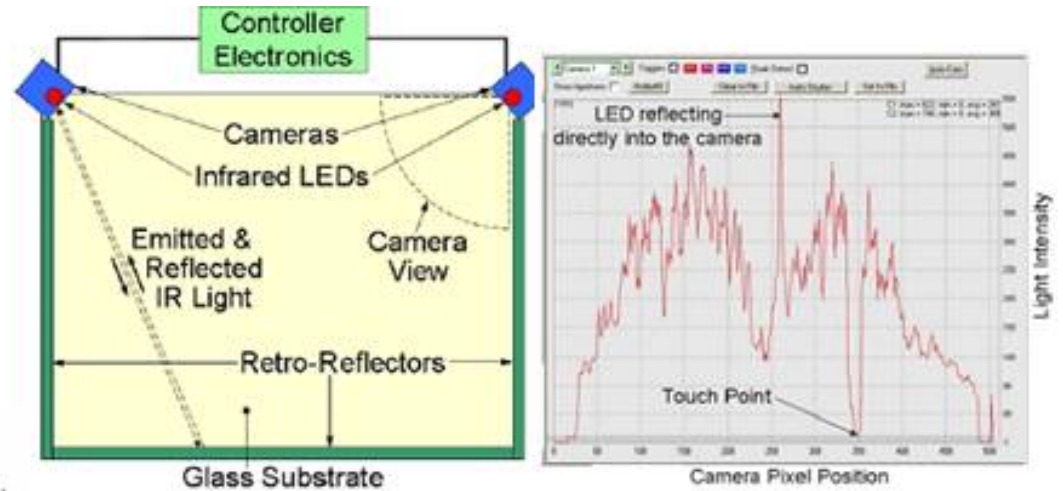


Projected Capacitance



Infrared Matrix

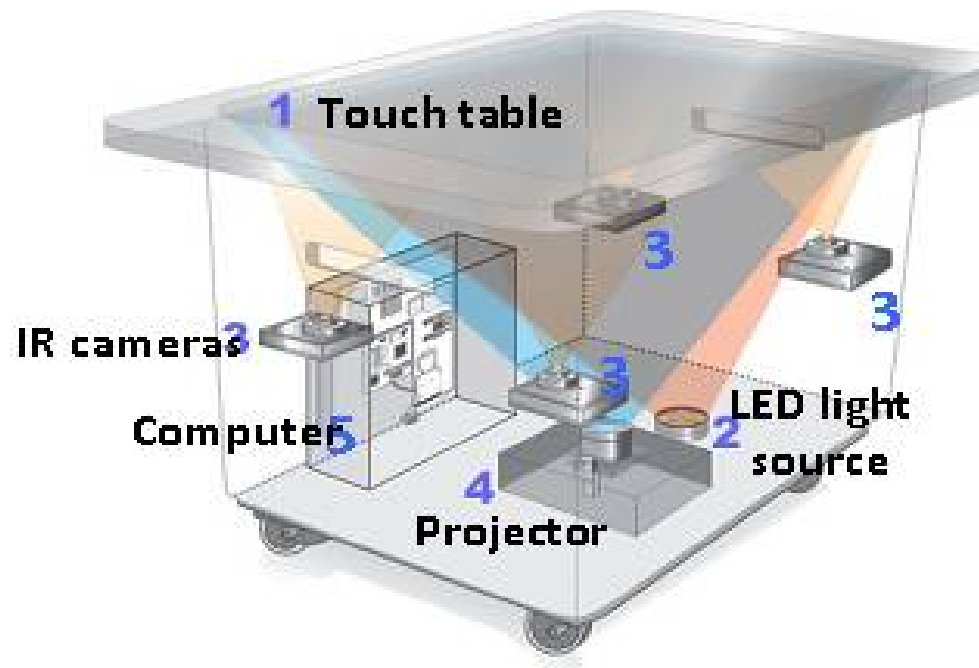
Large Size Touch Screen Technologies (2)



**Bending wave
Surface acoustic wave**

IR optical imaging

Large Size Touch Screen Technologies (3)



IR camera + Projector

Microsoft's Surface)

Large size LCD touch / multi-touch sensing technology is still in early development stage.

Large Size Touch Screen Technologies

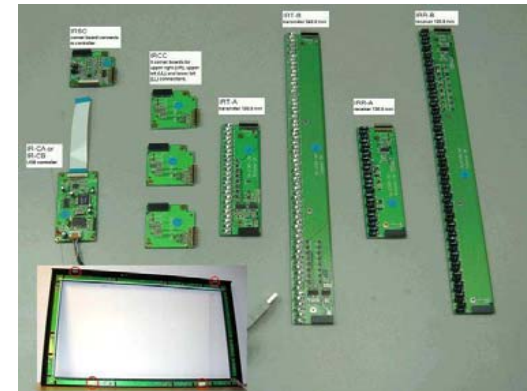
Technology	Projected Capacitance	Surface Acoustic Wave	Bending Wave	Infrared array	Optical Imaging
Multi-touch	Yes	Not Yet	Not Yet	Yes (Limited)	Yes (Limited)
Touch method	Finger	Finger, glove, soft stylus	Finger, glove, stylus	Finger, glove, stylus	Finger, glove, stylus
Display size	2'' – 100''+	8'' – 50''	3'' – 60''	8'' – 150''	12'' – 120''
Cost	H	M	M	M	M
Main limitations	Very high cost for large size	Sensitive to noise	No concept of "hold"	False touch Low resolution	False touch

What we need for large size LCD touch technology?

1. Low cost touch screen sensor
2. High performance multi-touch sensing & search algorithm

Cost of Large Size Touch Screen

- 19" Monitor vs. Touch screen monitor → X3-4
LCD Monitor: 180-330 US\$ (Samsung)
LCD touch monitor: 750-1000US\$ (Tyco ELO, Capacitance, SAW)
- 42" external touch screen module (not include FPD display)
Next Window: US\$ 1600 (IR optical image)
KEYTECH: US\$ 1800 (IR matrix)
Panasonic: US\$ 2400 (NA)
PS: 42" LCD TV retail price US\$ 750-1000



Need to have low cost touch screen sensor solutions for large size FPD
(LCD,PDP)

Conclusions

- Public information display (PID) will be the main driving forces for FPD after TV
- New technologies are in high demand for PID applications

Thank you for your attention!!