The Status of Touch On the Desktop & In Large-Format

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June 10, 2010
(Display Taiwan 2010)

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SOCIETY FOR INFORMATION DISPLAY

nextwindow
optical touch

Agenda

- Introduction
- Touch on the desktop (15” – 30”)
- Touch in large format (> 30”)
- Conclusions
- About NextWindow

Is Touch Really Just About Mobile Devices?

Is this all there is?

Is touch really all about **200M** mobile phones and everything else is more or less irrelevant?

No! Touch Is Spreading Everywhere

- **Touch was everywhere at the 2010 CES show (USA)**
  - There seemed to be a built-in assumption that <u>all consumer devices</u> should be touch-enabled

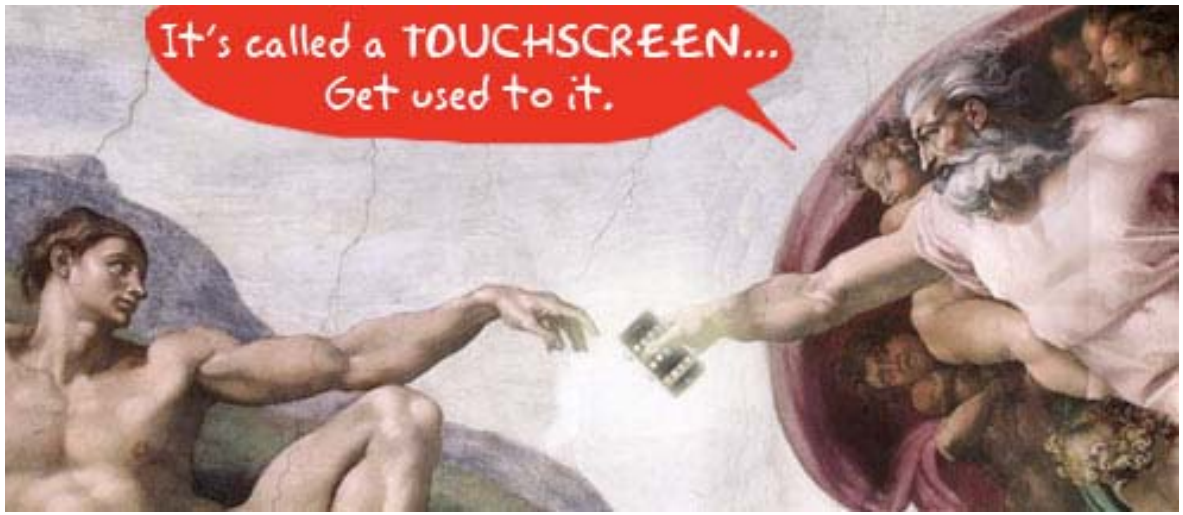
But…
There Are 13 Touch Technologies!

Touch Technology	Mobile (2” – 17”)	Stationary Enterprise (10” – 30”)	Stationary Consumer (15” – 30”)	Large-Format (>30”)
Analog Resistive	H	H	L	
Analog Multi-Touch Resistive (AMR)	F		F	
Surface Acoustic Wave (SAW)		H	F	L
Traditional Infrared (IR)		H	F	H
Waveguide Infrared (from ***RPO***)	F			
Surface Capacitive		H		
Projected Capacitive (ITO & on-cell) (P-cap)	H	F	F	
Projected Capacitive (wires on film) (P-cap)		L		L
Optical			H	H
Acoustic Pulse Recognition (APR from ***Elo***)	F	H		L
Dispersive Signal Touch (DST from ***3M***)				L
Embedded (in-cell)	F			
Vision-Based (like Microsoft Surface)				F
Force Sensing (no current supplier)				

H = High-volume **L** = Low-volume **F** = Future

Why Are There So Many Touch Technologies?

1. **Proliferation of touch**
2. **Touch is an indirect measurement**
3. **There is no perfect touch technology**
4. **The drive for fundamental intellectual property**
5. **Vertical integration**



Source: Gizmodo

❶ Proliferation of Touch

- Self-service reduces cost
- Displays everywhere at low cost
- Touch user interfaces are simpler
- Direct manipulation is easier
- Everything is shrinking
- Touch makes globalization easier
- Expectation of touch everywhere

Source: ServiceTec

❷ Touch Is An Indirect Measurement

Touch Technology	What's Being Measured
Resistive (all forms) & Embedded (voltage)	Voltage
Surface capacitive	Current
Surface acoustic wave	Time delay
Projected capacitive, Embedded (charge)	Change in capacitance
Optical & Infrared (all forms), Embedded (light) in high ambient	Absence of light
Embedded (light) in low ambient	Presence of light
Vision-based	Image
Acoustic Pulse Recognition (APR) & Dispersive Signal Technology (DST)	Bending waves
Force sensing	Force

The ideal method of detecting touch has yet to be invented!

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❸ There Is No Perfect Touch Technology

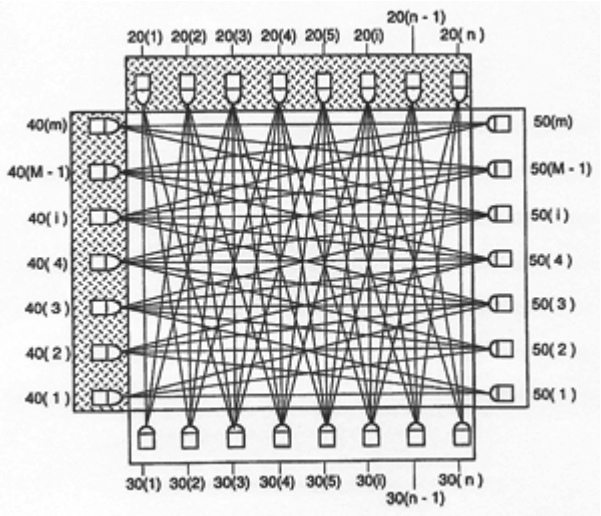
Example: Selecting the touch technology for a smartphone

Characteristic	Resist.	P-Cap	APR	AMR	W-IR	Embed.
Stylus independence	M	L	H	M	M	L
Multi-touch	L	H	L	H	M	H
High durability	L	H	H	L	H	M
High optical performance	L	M	H	L	H	H
Flush surface	M	H	H	M	M	H
Low power consumption	H	M	H	H	M	L
Stable calibration	L	H	H	L	H	H
Narrow borders	M	M	H	M	M	H
Substrate independence	M	H	M	M	H	H
Low cost	H	L	M	M	M	L
Multiple suppliers	H	H	L	M	L	M

H = High (Best) **M** = Medium (OK) **L** = Low (Worst)

❹ The Drive For Fundamental Intellectual Property

- **The fundamental intellectual property (IP) on all four* of the traditional touch technologies <u>has expired</u>**
  - ✦ New patents tend to be on enhancements



"Cross-beam" light paths increases resolution and fault-tolerance in infrared touchscreens (Elo)

- **Companies trying to establish a <u>sustainable competitive advantage</u> create new touch technologies**

e.g., Touchco, SiMa Systems, FlatFrog & others…

* Analog resistive, surface capacitive, SAW & IR

❺ Vertical Integration

- **LCD embedded (in-cell) touch**
  - When touch was insignificant, LCD manufacturers ignored it
  - Now that it has become more significant, LCD manufacturers want to embed it into their products (in-cell touch)

“There is no perfect touch technology”

Source: Studio 41

Touch on the Desktop

Desktop Touch Before Windows 7

- Vertical-application monitors (1990s)
- HP TouchSmart AiO (2007-2009)

Source: 3M

Source: HP

The Significance of Windows 7

- **Windows 7 fully enables desktop touch (Oct-09)**
  - Touch & multi-touch is a highly visible characteristic of Win-7
    - Win-7 supports up to ~100 touch points
  - Touch API is easy for ISVs to use to touch-enable apps
    - Applications can define their own custom gestures
  - Most PC OEMs have launched multiple desktop touch products
    - ~90% AiOs, ~10% monitors

Consumer Desktop Hardware

- **AiOs & monitors with Win-7 touch**
  - 30+ products from 14 OEMs
  - Acer, Asus, Dell, ECS, Fujitsu, Gateway, HP, Ilyama, Lenovo, Medion, MSI, NEC, Samsung, Sony
- **AiOs with single-touch**
  - Estimated at 10
- **AiOs with no touch**
  - Estimated at 25
- **Monitors with single-touch**
  - None

Examples

HP

Medion

NEC

Sony

Dell

Lenovo

Desktop Applications

- **Consumer software applications enhanced to take advantage of Windows-7 touch**
  - Estimated at 50
    - Art & creativity, media management, reading, games, educational…
    - Mostly consumption-oriented
  - It will take until the end of 2010 or mid 2011 until there are a substantial number of applications available
- **Enterprise vertical (e.g., CAD, GIS)**
  - Beginning to see some specialized applications
- **Enterprise horizontal (e.g., Office)**
  - No significant applications yet

Market Growth Factors

- **Touch on the desktop is best for consuming information rather than creating information**
- **Touch-enabled applications are slow to market**
  - Consumers won't buy touch-enabled hardware without compelling touch applications
- **Microsoft's support for multi-touch**
  - Enhancements such as the Surface capabilities (in the latest Windows-7 SDK) may make a BIG difference for ISVs
- **Incremental BOM cost for touch**
  - Cost is much less of an issue in all-in-ones vs. monitors
- **Ergonomic issues may be significant on the desktop**
  - So-called "gorilla arm"
    - Reclining monitors? (viewing angle & palm rejection)

Forecasts

- **Touch penetration rate is the key measure**
- **Forecasts vary widely**

Source	Date	Category *	2013 Penetration
DisplaySearch	6/09	Monitors & AiOs	3%
Morgan Stanley	6/09	Monitors & AiOs	22%
Credit Suisse	8/09	Monitors, AiOs & Notebooks	50%
DisplaySearch	6/09	Notebooks	4%
Morgan Stanley	6/09	Notebooks & Netbooks	20%

- **2010 total AiO forecasts range from 5-6M to 10-11M**

** Arbitrary combination of device types makes individual device forecasts impossible and comparison of forecasts difficult*

Desktop Touch Technology Comparison

	Characteristic	Optical	P-Cap	SAW	AMR	IR
	Size range 17” – 25”	H	M	H	M	H
➔	Touch with any object	H	L	L	M	H
	Light touch	H	H	L	M	H
	Multi-touch	M	H	M	H	M
➔	Object size recognition	H	H	L	M	L
	Fast response and drag	H	H	H	H	M
	Low profile (flush surface)	M	H	M	H	L
➔	High durability	H	H	H	L	H
➔	High optical performance	H	M	H	L	H
	Narrow border width	H	H	L	M	L
	Insensitive to EMI & RFI	H	L	H	H	H
	Easy integration	H	M	M	H	H
➔	Low cost	H	L	M	H	L
	Shipping in high volume	H	L	M	L	H
	Simple sensor manufacturing	H	L	M	L	M
	High MTBF	H	H	M	H	L
	Multiple sources	H	H	L	M	H

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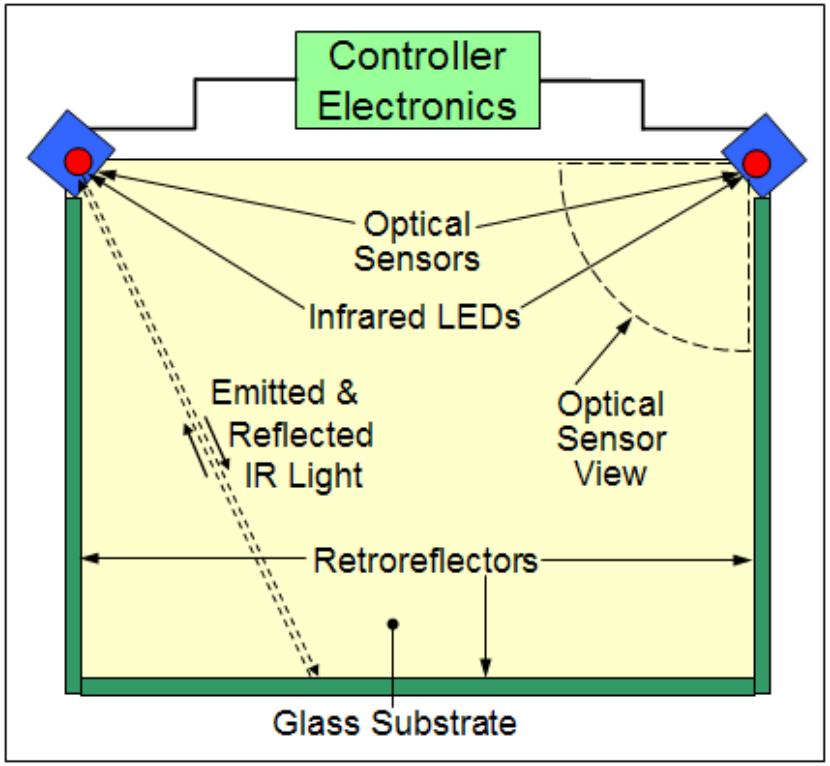
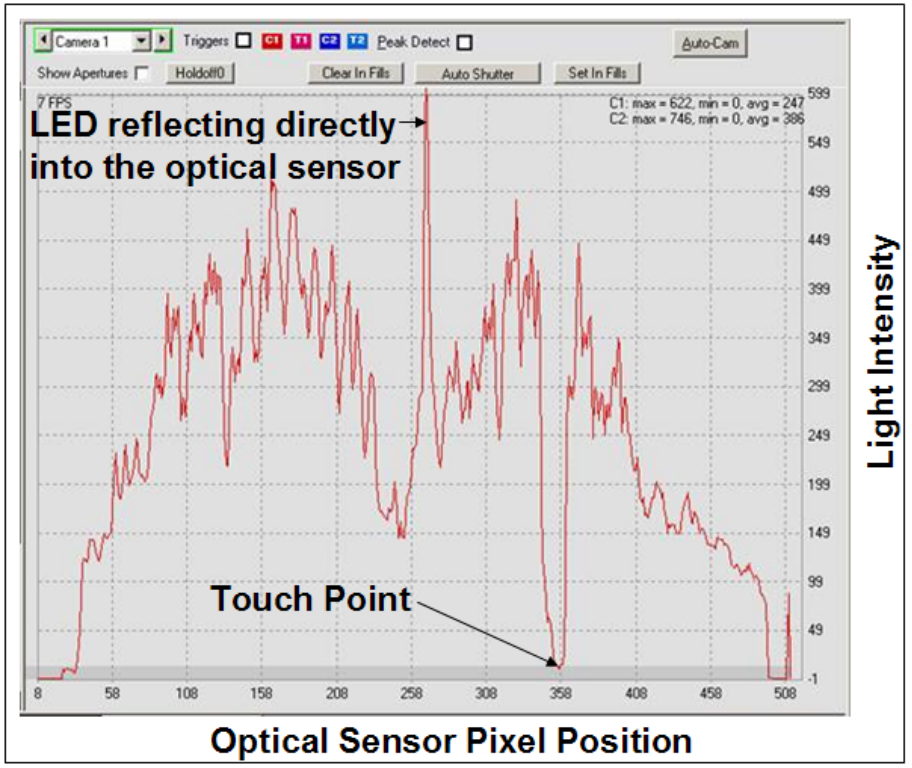
Question #1

Do you agree that optical is the future of 15” – 30” stationary consumer touch?

How Optical Touch Works





Source: AGreenLiving.org

Touch in Large Format

The Significance of Multi-Touch

- **History**
  - The iPhone, Microsoft Surface and Windows-7 all focused attention on multi-touch; Windows-8 will take it even further
- **Outlook**
  - Since there still aren't any clear applications for single users with more than two touches, multi-person gaming will probably drive multi-touch on large displays
    - Multi-user is more significant than one user with multiple fingers
    - Identifying which user is touching is still a problem
    - 4 users x 2 fingers each = 8 touches
  - Reality is that point-and-click (single touch) is still very common on large displays

Large-Format Hardware

- **Touch display platforms**
  - LCD, plasma, front & rear projection (including touch tables), opaque interactive whiteboards
    - Touch is available integrated into displays and as an overlay
  - Incremental cost for large-format touch is still relatively high
    - NextWindow's latest new product helps drive down the cost

NextWindow 2500 Series (New!)

- Kit of components for touch-screen; also available assembled on glass
- Fits screens from 30” to 52”
- Compatible with any display technology
- Thin borders & low profile
- Low cost
- Supports Windows-7 multi-touch
- Works with finger, glove or any object
- High optical quality
- Zero pressure required
- Unlimited touch durability
- One-time 4-point calibration
- USB powered

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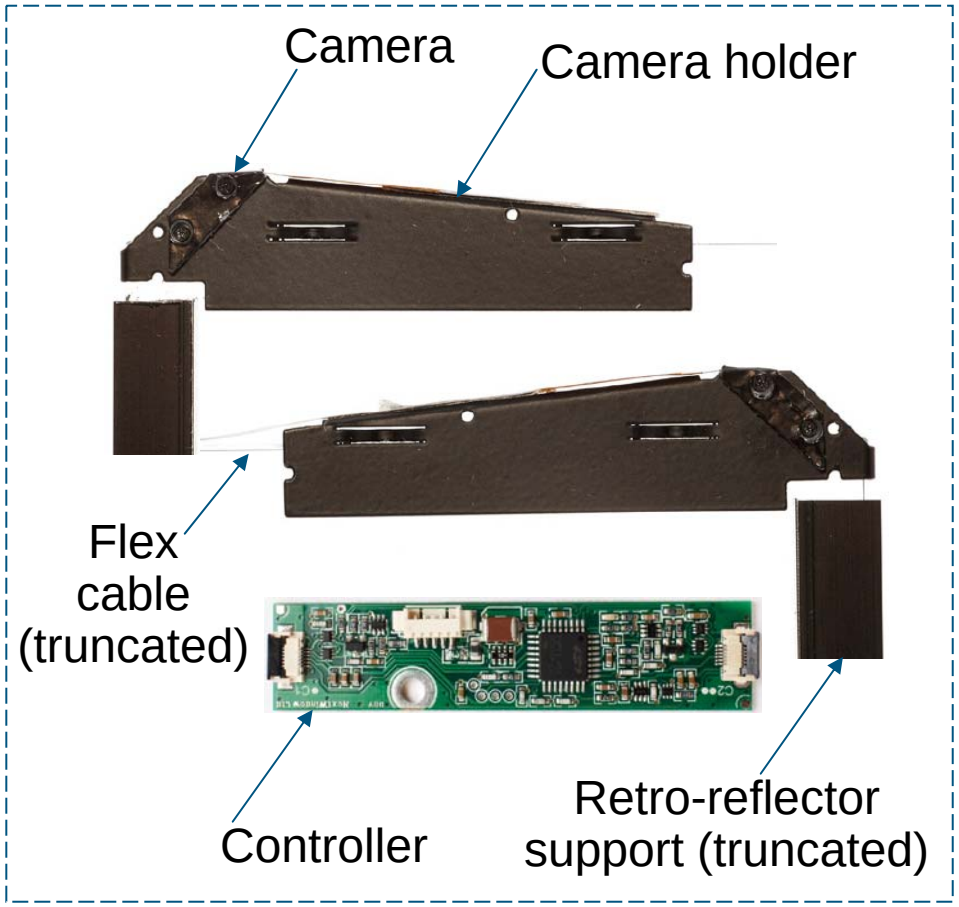
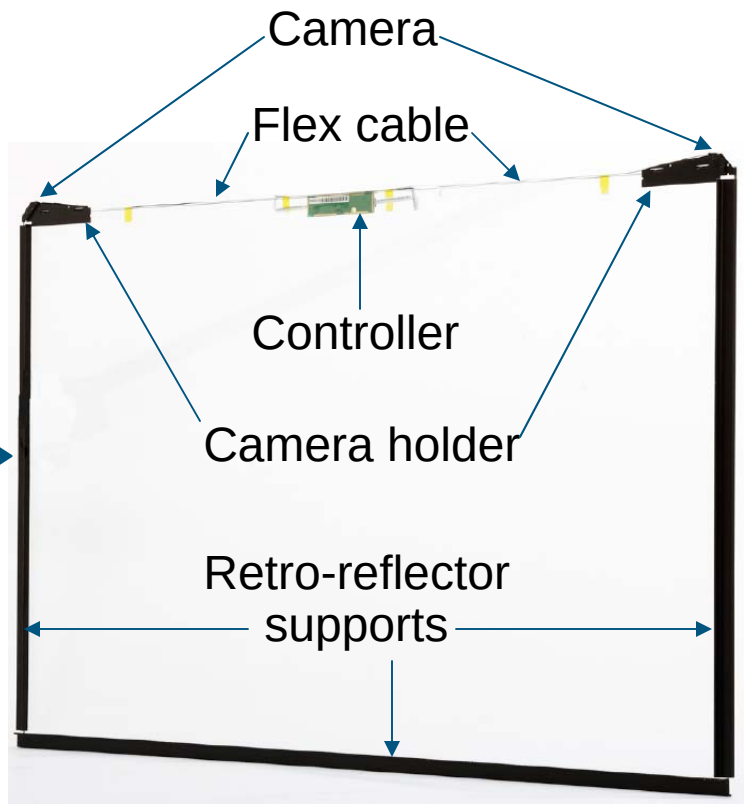
2500 Series Component Kit





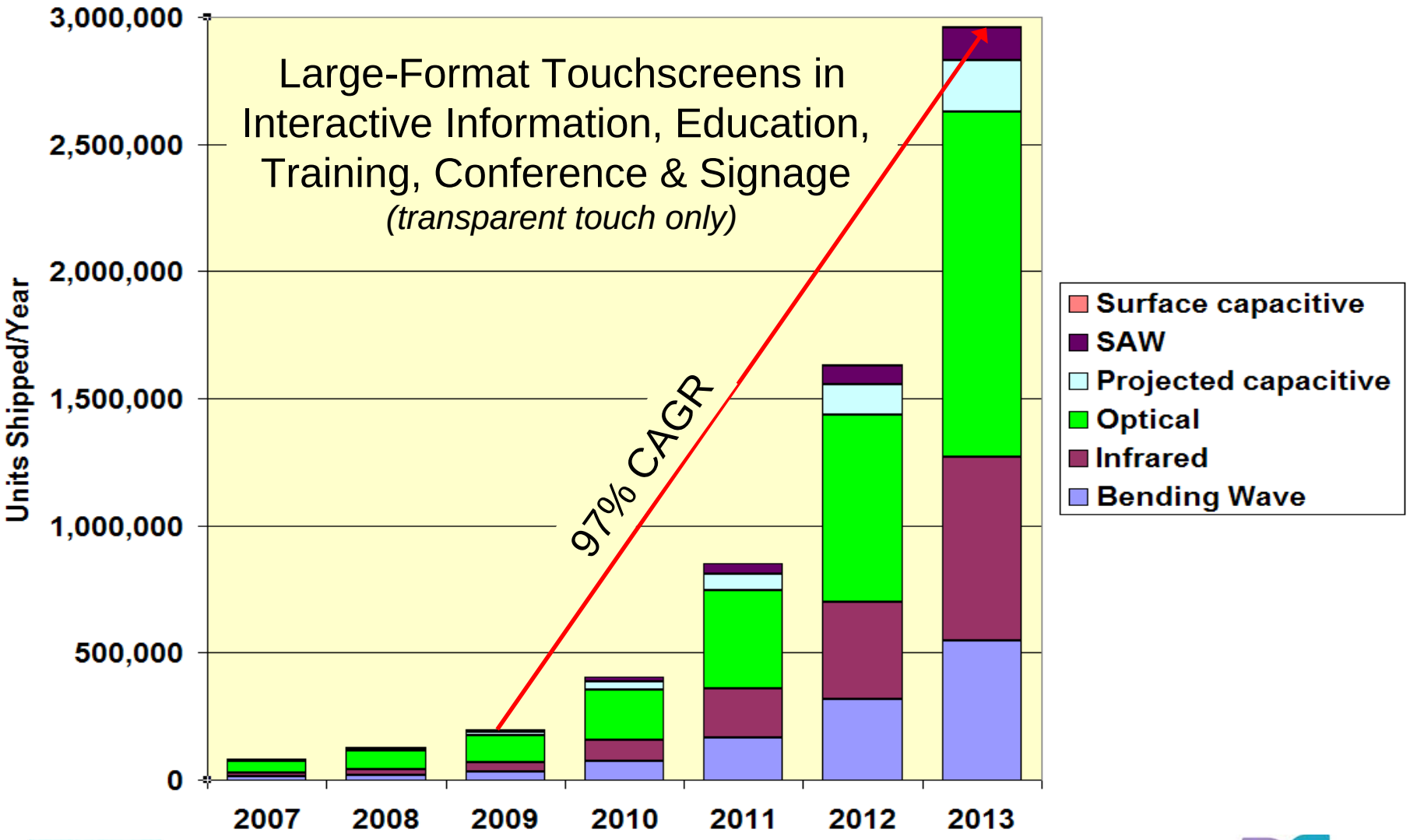
Large-Format Applications

- **Two market segments by size**
  - #1: Information access, collaboration, interactive digital signage
    - 32 – 52 inches
  - #2: Education, training, conference rooms
    - 55 inches and larger
- **Interactive digital signage**
  - Least-established of all applications above
  - What's missing is a business model that justifies the investment and monetizes the value of interactivity
    - Lawnmower sales example…

Market Growth Factors

- **Continued display & touch-screen cost reduction**
- **Increased use of touch everywhere**
- **Market segment growth drivers**
  - Interactive information: Increased digital data availability
  - Education: Government – increased spending;
    Corporate – ROI studies
  - Interactive digital signage: Business model
- **What about TV?**
  - Touch on small-screen TVs (all-in-one TV-monitor)
  - Gestures, not touch, on big-screen TVs except in special cases

Large-Format Forecast



Data from iSuppli's *Emerging Display Technologies 4Q-2009 Special Report*

Large-Format Touch Technology Comparison

	Characteristic	Optical	IR	P-Cap (Film)	SAW	APR	DST
➔	Touch with any object	H	H	L	M	H	H
	Touch with a small object	M	L	L	M	H	H
	Light touch	H	H	H	L	M	H
	No unintended touch	M	L	H	H	H	H
	Multi-touch	M	M	M	L	L	L
	Touch-and-hold	H	H	H	H	L	L
	Object size recognition	H	L	M	L	L	L
	Measures Z-axis	M	L	M	H	L	L
➔	High optical performance	H	H	M	H	H	H
	Flush surface (low profile)	M	L	H	M	H	H
	Resistant to contaminants	M	M	H	L	H	H
	Insensitive to EMI and RFI	H	H	L	H	H	H
	Insensitive to ambient infrared	M	M	H	H	H	H
	Works with plastic substrate	H	H	H	L	L	L
➔	Low cost	H	L	L	M	M	L
➔	Scalable	H	L	M	M	H	H
	Simple sensor manufacturing	H	M	L	M	H	H
	High MTBF	H	L	M	M	H	M
➔	Multiple sources	H	H	H	H	L	L

H = High (Best) **M** = Medium (OK) **L** = Low (Worst)

Question #2

Do you agree that
optical is the future
of large-format touch?

Conclusions

- **Desktop touch and large-format touch are emerging**
  - Desktop touch is dependent on Win-7 application programs
  - Large-format touch is dependent on continued penetration of interactive displays into education, and a business model for interactive digital signage
- **There are 7 different touch technologies in the combined desktop & large-format space**
  - Large number of choices adds confusion
  - There is no perfect touch technology, but optical is the strongest contender in both areas
- **There are business opportunities at all levels of the supply chain**

About NextWindow

- **NextWindow**
  - Develops & manufactures optical touchscreens
  - Currently focused on two touch-screen markets
    - Windows-7 consumer monitors and all-in-one computers
    - Large-format display applications such as interactive digital signage
  - Global presence
    - New Zealand (HQ), Singapore (Ops), USA, Taiwan, Korea, Japan
    - Manufacturing in China, Thailand and Malaysia
    - 119 employees, 55 in engineering
  - Brief history
    - 2000: Founded by CTO and private investors
    - 2003: First product to market (optical touch for large displays)
    - 2005: Entered USA market
    - 2006: First major volume contract signed (HP TouchSmart AiO)
    - 2008: Entered Taiwan market with ODM focus
    - 2009: Engaged with many PC OEMs & ODMs on Win-7 products
    - 2010: Acquired by SMART Technologies

Suggestion #1

Come see the future
of touch at NextWindow
in Booth B019!

Thank You!

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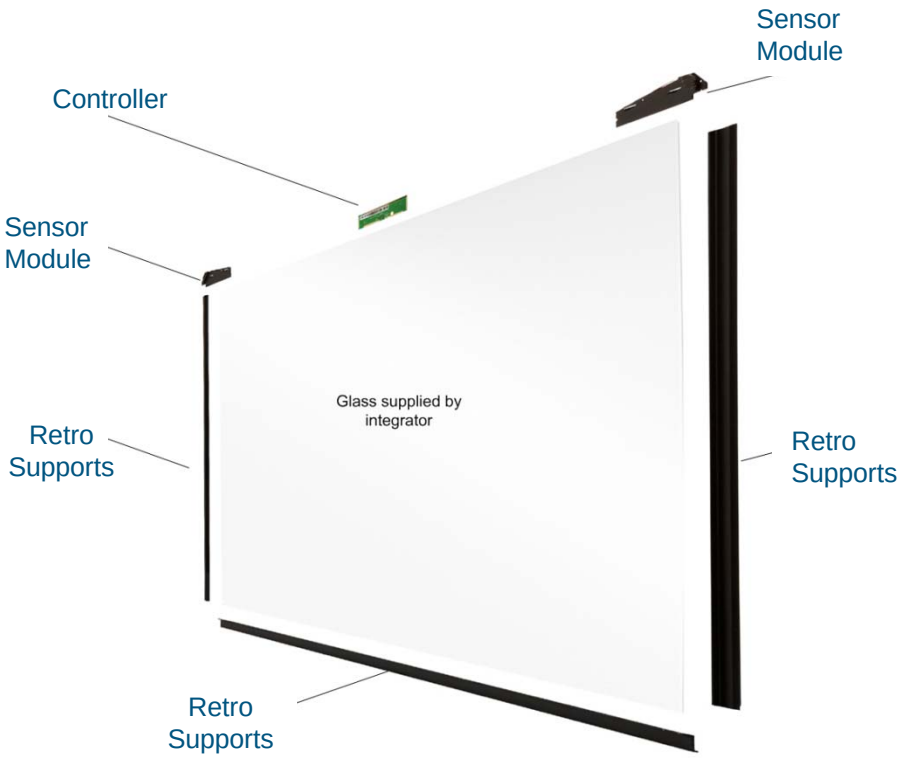
Appendix

Products on display
at Display Taiwan 2010

1900 OEM Touch-Screen

- High-volume OEM components
- Microsoft Windows-7 multi-touch logo
- Kit, on-glass or glassless
- 15” to 30”
- Highly durable
- Low cost
- Easy integration
- USB interface

2500 OEM Touch-Screen



- High-volume applications
- Standard sizes from 30” to 52”
- Low cost
- Microsoft Windows-7 multi-touch ready
- Low profile & narrow border
- Kit or on-glass
- USB powered (no external power supply)

2150 OEM Touch-Screen

- Standard sizes from 30” to 103”
- Passive illumination & reduced components yields higher MTBF
- Microsoft Windows-7 multi-touch ready
- Kit or on-glass
- USB powered (no external power supply)

2700 Touch-Screen Overlay

- Integrates over almost any large display
- Adds touch to any computer application
- Protective overlay guards against abuse
- Microsoft Windows-7 multi-touch ready
- Fully compatibility (no proprietary drivers)