



Touch On the Consumer Desktop and In Large-Format

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Agenda



- ◆ **Introduction**
- ◆ **Touch on the consumer desktop (15" – 30")**
- ◆ **Touch in large format (> 30")**
- ◆ **Conclusions**
- ◆ **Appendix**
 - ❖ NextWindow products on display at FPD International 2010



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 for signage and education
- ❖ Global presence
 - New Zealand (HQ), Singapore (Ops), USA, Taiwan, Korea, Japan
 - Manufacturing in China, Thailand and Malaysia
 - 138 employees, 67 in R&D
- ❖ 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 (HP TouchSmart AiO)
 - 2008: Established Taiwan office with ODM focus
 - 2009: Engaged with many PC OEMs & ODMs on Win-7 products
 - 2010: Acquired by SMART Technologies

Touch Isn't Just About Mobile Devices



Source: Apple

Touch on mobile devices (especially on **200M** phones) **IS** driving the industry, but it's **NOT** the only interesting part of the market!

Touch Is Spreading Everywhere!



- ◆ There's beginning to be an assumption that all consumer devices should be touch-enabled



But...

There Are 14 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	
Digital Multi-Touch Resistive (DMR)	F			
Surface Acoustic Wave (SAW)		H	F	L
Traditional Infrared (IR)		H		H
Waveguide Infrared (from RPO)	F			
Surface Capacitive		H		
Projected Capacitive (ITO) (P-cap)	H	F	F	
Projected Capacitive (wires) (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 & on-cell)	F			
Vision-Based (like Microsoft Surface)				F
Force Sensing (no current supplier)				

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

What Are We NOT Going To Talk About?



◆ Stationary devices 10” – 30” in enterprise applications

- ❖ NextWindow believes that **multiple touch technologies** will continue to dominate for a combination of application, technical and business reasons
 - Kiosks = SAW or surface capacitive
 - Casino gambling = Surface capacitive
 - Point of sales (POS) = 5-wire resistive or traditional infrared
 - Industrial control = 5-wire resistive
 - Outdoor device control = Projected capacitive
 - Medical device = 4-wire resistive, SAW or APR...

(There is no perfect touch technology!)





Touch On the Consumer Desktop



In the Beginning: The HP TouchSmart AiO



Gen-1
2007



Gen-2
2008



Gen-3
2009



Gen-4
2010

And Then Came 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 applications
 - Applications can define their own custom gestures
- ❖ Most PC OEMs have launched multiple desktop touch products
 - ~90% AiOs, ~10% monitors



Consumer Desktop Touch Hardware



◆ **AiOs & monitors with Win-7 touch**

- ◆ 30+ products from 14 OEMs
- ◆ Acer, Asus, Dell, ECS, Fujitsu, Gateway, HP, Iiyama, Lenovo, Medion, MSI, NEC, Samsung, Sony

◆ **Low-end AiOs with single-touch**

- ◆ Estimated at 10

◆ **AiOs with no touch**

- ◆ Estimated at 30

◆ **Consumer monitors with single-touch**

- ◆ None



Consumer Desktop Examples



ASUS



Medion



NEC



Sony



Dell



Lenovo



Consumer Desktop Applications



- ❖ **Consumer software applications enhanced to take advantage of Windows-7 touch**
 - ❖ Estimated at 40
 - Art & creativity, media management, reading, games, educational...
 - Mostly consumption-oriented
 - ❖ More applications are coming, but progress is slow

- ❖ **Enterprise vertical (e.g., CAD, GIS)**
 - ❖ Beginning to see some specialized applications
- ❖ **Enterprise horizontal (e.g., Office)**
 - ❖ No significant applications yet

Consumer Desktop Touch Market Forecast



◆ Aggregate consumer desktop touch market forecast

- ◆ Based on information from Credit Suisse, Daiwa Capital, Morgan Stanley, iSuppli, DisplaySearch and NextWindow

Category	2010 Units			2011 Units		
	Market	Penetration	Touch	Market	Penetration	Touch
AiOs	10M	45%	4.4M	14M	60%	8.5M
Monitors	139M	1.0%	1.4M	142M	3.0%	4.3M

◆ What's needed to make the market grow faster?

- ◆ More touch-enabled applications from independent software vendors (ISVs)
 - Applications for Windows-7 tablets may migrate to the desktop
- ◆ More touch optimization in the Windows user interface
 - Not likely to happen until Windows-8 in 2012, although some enhancements have been made in the latest SDK

Market Requirements for Touch On the Consumer Desktop



◆ **The requirements are surprisingly simple**

- ❖ Size range 15” to 30”
- ❖ Low cost (around \$2 per diagonal inch)
- ❖ Multi-touch that meets the Windows-7 Logo requirements

◆ **Touch technologies that meet the requirements (3)**

- ❖ Optical
- ❖ Surface acoustic wave (SAW)
- ❖ Analog multi-touch resistive (AMR)



Market Requirements for Touch On the Consumer Desktop...2



- ❖ **Touch technologies that DON'T meet the requirements (11)**
 - ❖ Projected capacitive and traditional infrared
 - **Too expensive – although these two are closest to emerging**
 - ❖ Analog resistive, surface capacitive, acoustic pulse recognition (APR) and force-sensing
 - **No multi-touch**
 - ❖ Embedded (in-cell & on-cell), digital multi-touch resistive and waveguide infrared
 - **Too small**
 - ❖ Dispersive signal technology (DST) and vision-based
 - **Too big**

Why Optical Touch Is Best On the Consumer Desktop



◆ Touch with any object

- ❖ Use a finger, stylus, paintbrush, glove, credit card, eraser, etc.
- ❖ More versatile than SAW's soft touch-object, AMR's non-sharp touch-object or pro-cap's finger-only

◆ Zero-force touch

- ❖ Effortless interaction with the screen
- ❖ Much easier than SAW's or AMR's typical 80 grams of force

◆ High optical performance

- ❖ No dimming or fuzzing in the displayed image
- ❖ Better performance than the light-absorbing films in AMR



Why Optical Touch Is Best On the Consumer Desktop...2



✦ **Object size recognition**

- ❖ Allows an application to make decisions based on what is being used to touch the screen
- ❖ SAW doesn't support object-size recognition

✦ **Highly durable touch surface**

- ❖ Glass doesn't have a wear-out mechanism
- ❖ Much more durable than AMR's PET top surface



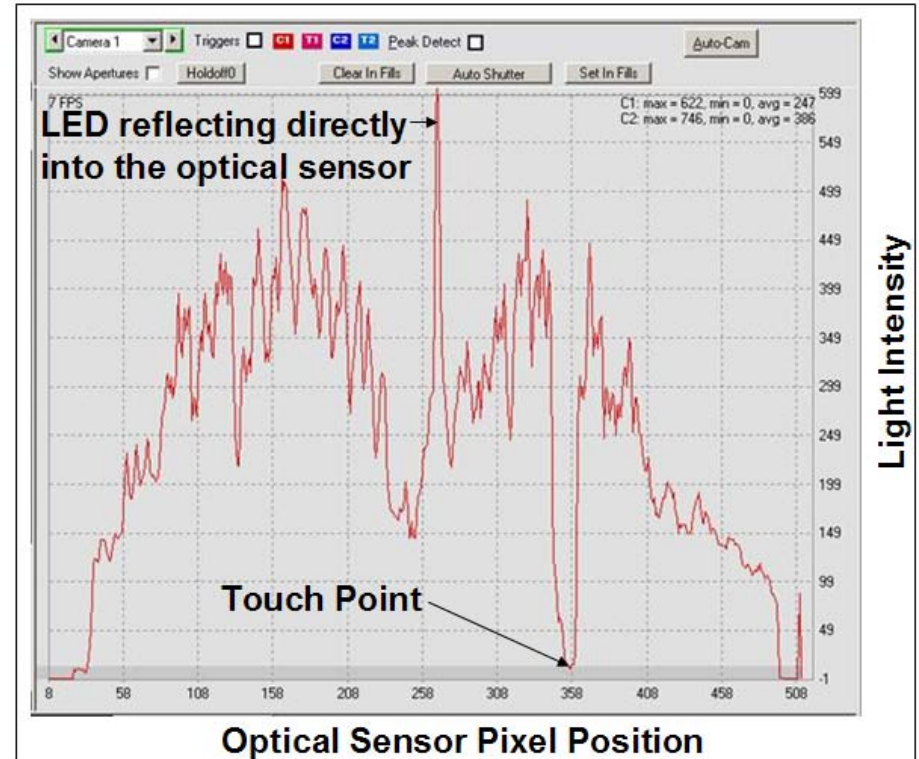
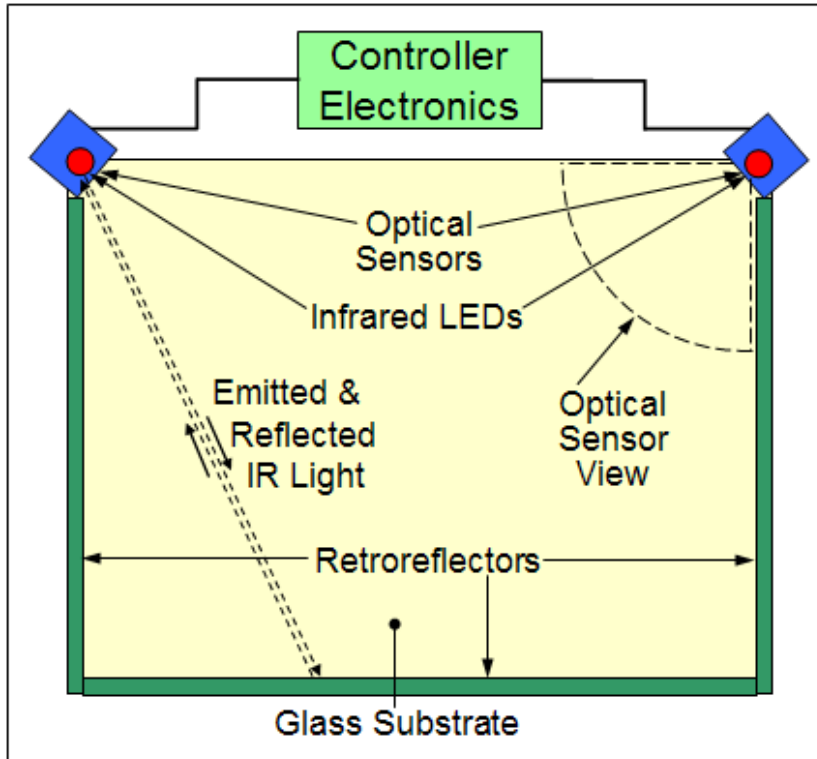
Consumer Desktop Touch Technology Comparison



Characteristic	Optical	SAW	AMR	Projected Capacitive
Size range 15" – 30"	H	H	M	M
✓ Touch with any object	H	L	M	L
✓ Light touch	H	L	M	H
Multi-touch	M	M	M	H
✓ Object size recognition	H	L	M	H
Fast response and drag	H	H	M	H
Low profile (flush surface)	M	M	H	H
✓ High durability	H	H	L	H
✓ High optical performance	H	H	L	M
Narrow border width	H	L	M	H
Insensitive to EMI & RFI	H	H	H	L
Easy integration	H	M	H	M
Low cost	H	M	H	L
Shipping in high volume	H	M	L	L
Simple sensor manufacturing	H	M	L	L
High MTBF	H	M	H	H
Multiple sources	H	L	M	H

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

How Optical Touch Works





Touch In Large-Format



Large-Format Touch Hardware



◆ Touch display platforms

- ❖ LCD and plasma displays over 30”
 - Touch is available integrated into display bezels and as an overlay
 - Incremental cost for large-format touch is still relatively high; NextWindow’s latest new product helps drive down the cost

◆ What are we NOT going to talk about?

- ❖ Front & rear projection (including touch tables)
- ❖ Opaque interactive whiteboards

Large-Format Applications



◆ Two main market segments by size

- ◆ #1: Information access, collaboration and interactive digital signage
 - 32" – 65"
- ◆ #2: Education/training and conference rooms
 - 46" and larger



Interactive Digital Signage



◆ Digital signage

- ❖ Current non-interactive digital signage business model is based on advertising impressions, similar to other media such as print or TV



◆ Interactive is different

❖ Interactive content

- Requires much deeper content that changes more frequently

❖ Interactive business model

- Requires a business model based on the **value of interactivity**



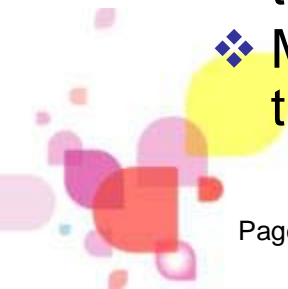
Interactive Digital Signage...2



◆ Value of interactivity

- ❖ Interaction yields information about user wants and desires
- ❖ Information can be used to precisely target the most appropriate demographic and obtain instant feedback on a product

◆ Capabilities

- ❖ User-controlled content
 - ❖ Targeted messaging
 - ❖ Dynamic promotional offers to cross-sell or up-sell
 - ❖ Sales tools to guide customers through product selection
 - ❖ Testing multiple ad campaigns with different themes and appeals
 - ❖ A pay-for-performance model with the benefit of paying only for viewers with demonstrated interest
 - ❖ Determining which venue is most effective at attracting the targeted audience
 - ❖ Mining the resulting data for patterns, connecting the ads that attract customers to the things that they buy
- 

Market Growth Factors



- ◆ **Continued display & touch-screen cost reduction**
- ◆ **Increased use of touch everywhere**
- ◆ **Market segment growth drivers**
 - ❖ Interactive information: Increased digital data availability
 - ❖ Collaboration: ROI & productivity studies
 - ❖ Interactive digital signage: Validated new business model
 - ❖ Education: Increased government spending
 - ❖ Conference rooms: Increased capital investment
- ◆ **What about TV?**
 - ❖ Touch on small-screen TVs (all-in-one TV-monitor) is natural
 - ❖ Gestures are a potential “10-foot interface” on big-screen TVs
 - ❖ Touch can be the “arm’s-length interface” when the TV is being used for non-TV applications (IWB, Internet access, etc.)

iSuppli's View of Large-Format Optical Touch

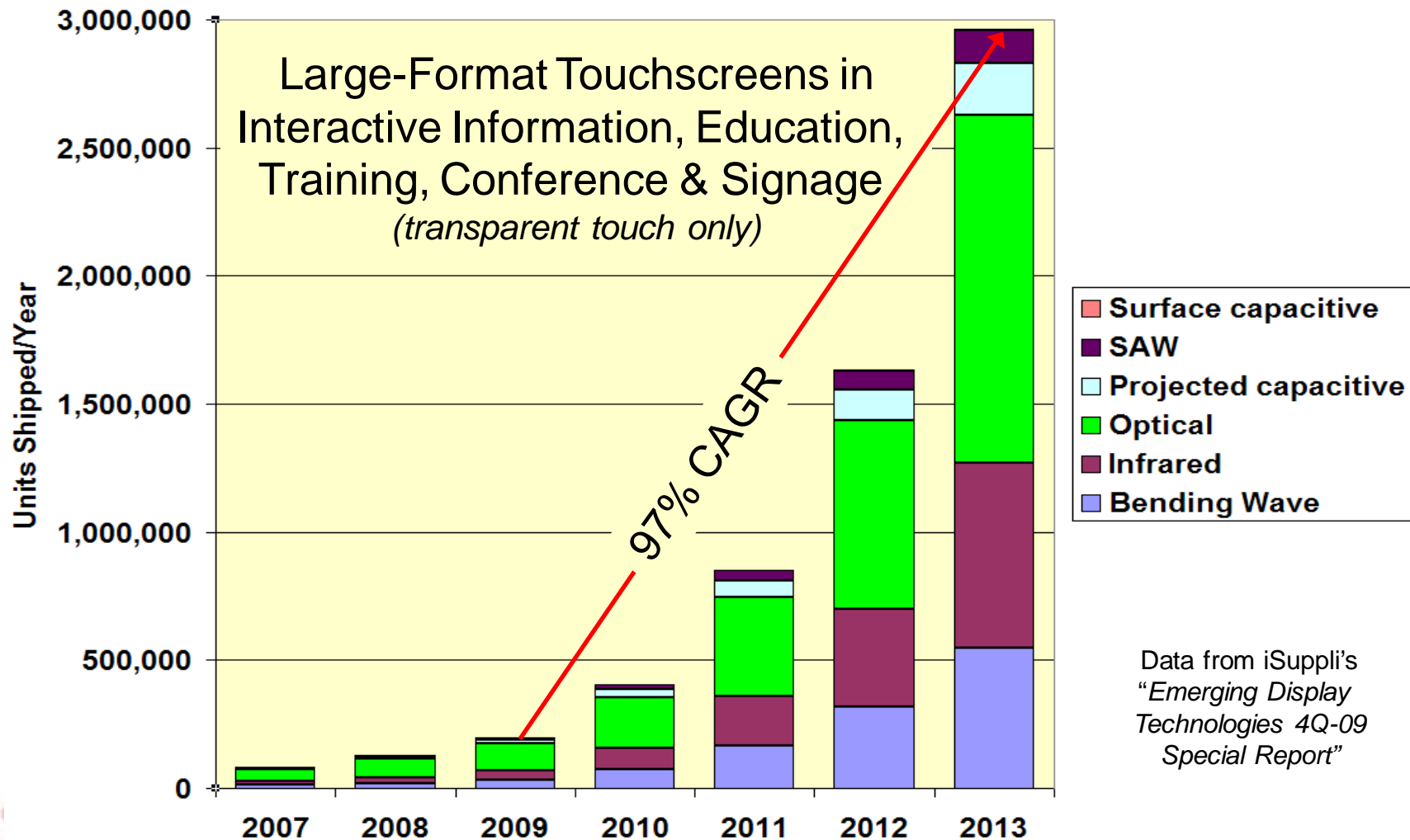


“Camera-based optical touch offers high optical performance, robustness and scalability, and is a very strong candidate for the signage and professional market. In addition, its cost-effective scaling is an advantage against competing technologies such as IR.”

“By 2013, optical imaging will emerge as the leading single touch-screen technology in the signage and professional display market, accounting for 25.6 percent of worldwide unit shipments. The dominant use for optical imaging touch-screen technology will be in conference rooms.”

Source: iSuppli, “Touch Screen Interfaces Continue to Drive Growth in Signage and Professional Applications” Report, 12/09

iSuppli's Large-Format Touch Forecast



Data from iSuppli's
"Emerging Display
Technologies 4Q-09
Special Report"

Market Requirements for Touch In Large-Format



◆ The requirements are relatively simple

- ❖ Size range 30” to 100+”
- ❖ Work on top of LCD or PDP
- ❖ Low cost
- ❖ Low profile height and narrow border width

◆ Touch technologies that meet the requirements (6)

- ❖ Optical
- ❖ Traditional infrared (IR) } Majority
- ❖ Projected capacitive (wires on film)
- ❖ Surface acoustic wave (SAW)
- ❖ Acoustic Pulse Recognition (APR from Elo)
- ❖ Dispersive Signal Technology (DST from 3M)

Market Requirements for Touch In Large-Format...2



◆ Touch technologies that DON'T meet the requirements (8)

- ❖ Analog resistive, analog multi-touch resistive (AMR), digital multi-touch resistive (DMR), surface capacitive, waveguide infrared, and embedded (in-cell & on-cell)
 - Too small
- ❖ Vision-based
 - Requires projection
- ❖ Force sensing
 - No suppliers



What About Multi-Touch?



◆ History

- ❖ The iPhone, Microsoft Surface, Windows-7 and the iPad all focused attention on multi-touch; Windows-8 will take it 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



Why Optical Touch Is Best for Large-Format



- ◆ **Touch with any object**

- ◆ Unlike pro-cap's finger-only or SAW's soft touch-object

- ◆ **Zero-force touch**

- ◆ Lighter than DST & APR; much lighter than SAW

- ◆ **Object size recognition**

- ◆ Better than pro-cap; others don't support object-size recognition

- ◆ **High optical performance**

- ◆ No visible wires like in pro-cap film

- ◆ **Insensitive to EMI and RFI**

- ◆ Unaffected by interference, unlike pro-cap



Why Optical Touch Is Best for Large-Format...2



- ◆ **Lowest cost**

- ◆ Most economical large-format touch-screen solution

- ◆ **Scalable to >100 inches**

- ◆ No added components needed, unlike IR

- ◆ **High MTBF**

- ◆ Minimal components, unlike IR

- ◆ **Multiple sources**

- ◆ Unlike sole-source DST & APR



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	H	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)

Conclusions



✦ Desktop touch and large-format touch are emerging

- ❖ Growth in consumer desktop touch is dependent on Windows-7 application programs to create consumer demand
- ❖ Growth in large-format touch is dependent on continued reduction in the cost of large displays
 - Interactive information and education are the two largest existing market segments
 - Interactive digital signage is a high-potential market segment that needs a validated new business model

✦ 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



Thank You!

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Appendix



NextWindow
products on display
at FPD International 2010
(See us in Booth 4725)



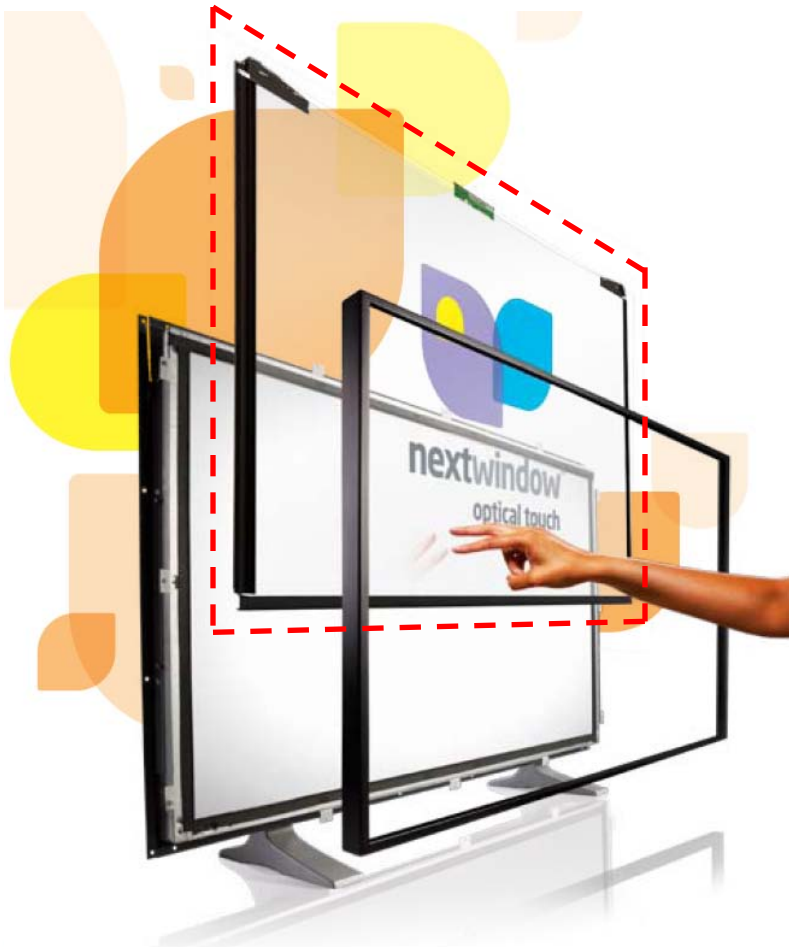
DesktopTouch 2S

Optical Touch-Screen Components



- ◆ High-volume OEM **desktop** components
- ◆ 15" to 30" as a kit, on-glass or glassless
- ◆ Two cameras and Microsoft Windows-7 multi-touch logo
- ◆ Standard and low-profile versions
- ◆ Highly durable
- ◆ USB interface
- ◆ Low cost

2500 ProfileTouch Optical Touch-Screen Components



- ◆ High-volume OEM **large-format** monitor components
- ◆ Standard sizes from 30" to 50" as a kit or on-glass
- ◆ Compatible with any display technology
- ◆ Microsoft Windows-7 multi-touch ready
- ◆ Low profile and thin borders
- ◆ USB powered
- ◆ Lower cost than competitive touch technologies

2150 ProfileTouch Optical Touch-Screen Components



- ◆ Low-volume **large-format** integration components
- ◆ Standard sizes from 30" to 120" as a kit (all sizes) or on glass (up to 50")
- ◆ Compatible with any display technology
- ◆ Microsoft Windows-7 multi-touch ready
- ◆ USB Plug & Play or serial interface
- ◆ USB powered

2700 OverlayTouch Optical Touch-Screen **Overlay**



- ◆ Attachable by an end-user over almost any large display
- ◆ Standard sizes from 30" to 82"
- ◆ Adds touch to any computer application
- ◆ Microsoft Windows-7 multi-touch ready
- ◆ Once-only four-point calibration with no drift
- ◆ USB Plug & Play or serial interface
- ◆ USB powered