USI | Universal Stylus Initiative

Enabling a Universal Stylus

MyScript Conference – San Jose

October 19 2015

Agenda

- Stylus Industry News
- Why USI?
- Universal Stylus Initiative
- Technology Overview
- Work to be Done
- How to Join the Effort

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Industry News

Recent Product Announcements

- Convert handwriting to text. Even highlight PDFs.
- One click to One Note – opens blank One Note page.
- Double click for screen capture.
- Click and hold for Cortana.
- 1024 levels of pressure
- "**Surface Pen feels as good as pen on paper**" – Microsoft

"web searches conducted with Cortana open in Windows 10's new Edge browser—pages that you can then mark up using the Surface Pen. Seamless." – PC World

- Highly responsive. Virtually no lag.
- Draws lines of any weight. Just apply pressure.
- Add shading with a tilt of the hand

"Apple claims **it feels like a true writing or drawing instrumen**t."
"Apps like the built-in Mail and Notes apps all support Apple Pencil, allowing you to ink in notes or email messages. "
"PowerPoint has great support for the Apple Pencil, allowing you to convert ink into objects in slidedecks." – The Verge

Other Stylus Related News

- USI Launched to Create a Specification for an Active Stylus – April 2015
  - http://www.universalstylus.org/news-events/usi-launched/
- Microsoft buys N-Trig's digital pen technology for Surface – May 1, 2015
  - http://www.cnet.com/news/microsoft-acquires-surface-pen-technology-from-n-trig/
- Steve Jobs may have hated the stylus, but Apple sure has a lot of patents for awesome styli floating around the U.S. Patent and Trademark Office. - Digital Trends – July 30, 2015
  - http://www.digitaltrends.com/mobile/apple-stylus-patent-texture/
- Research: Handwriting Spurs Brain Activity, Typing Doesn't – Education News (2014)
  - http://www.educationnews.org/technology/research-handwriting-spurs-brain-activity-typing-doesnt/
- Cursive handwriting is disappearing from public schools - The Washington Post (2013)
  - "Cursive writing is a traditional skill that has been replaced with technology,"
  - https://www.washingtonpost.com/local/education/cursive-handwriting-disappearing-from-public-schools/2013/04/04/215862e0-7d23-11e2-a044-676856536b40_story.html

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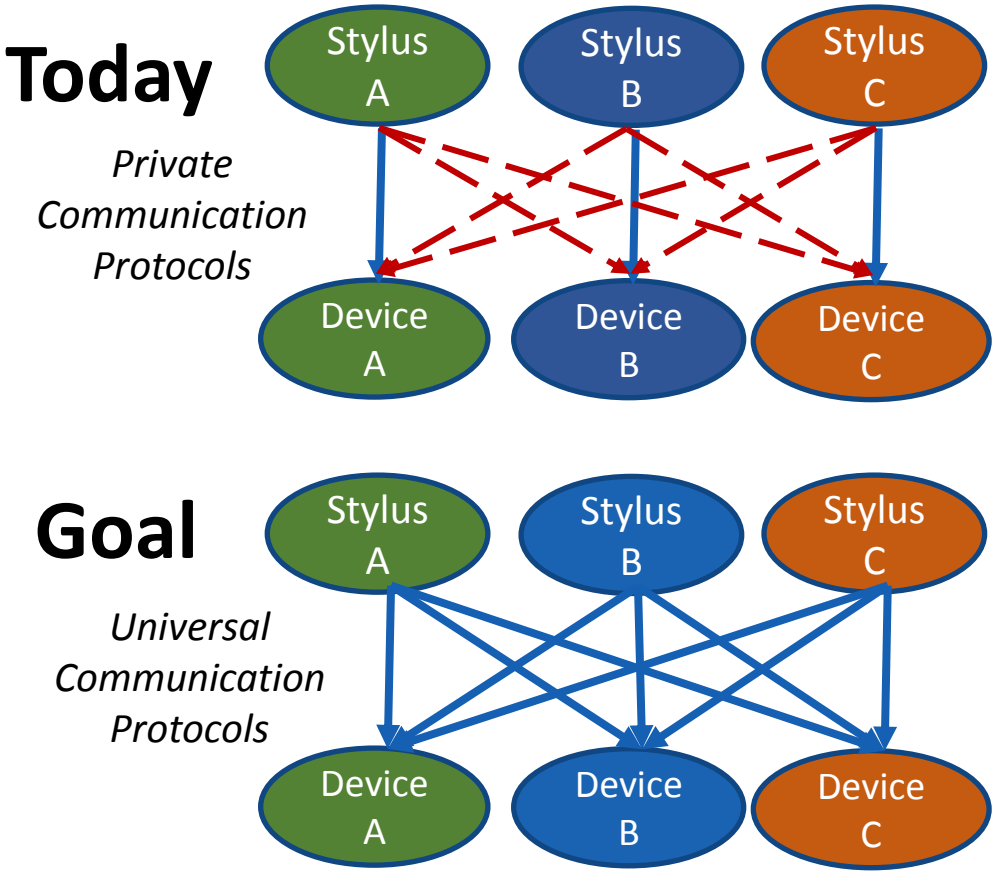
Why USI ?

Why USI?

- Today: No stylus standardization, solutions are proprietary and expensive
  - **End user Desire:** Stylus/Pens work across all digital devices
  - **Industry Desire:** Broad penetration of Stylus to provide the best user experience, drive scale for better BOM cost
  - Many different technologies & solutions
    - P-cap (many varieties), EMR, Ultrasound, Optical - None of which work across systems
    - Passive stylus – lack capability & accuracy



"The market has sorely been needing a universal communication standard for active stylus"

- Jon Peddie of Jon Peddie Research

Advantages of Standardization – Pen/Stylus Manufacturer's Perspective

Three major advantages of USI from pen manufactures perspectives:

- Activating the stylus market and help increase the **penetration ratio**.
- Potential **cost reduction** for standard components.
- Help **shorten development lead time** by standardization.

Advantages of Standardization - Touch Manufacturer's Perspective

Three major advantages of USI from touch manufacturer's perspectives:

Standardization of communication can help **expand the market.**

Economies of learning allow **better designs** through collective industry knowledge.

New advanced features supported by multiple OS can give **better end customer experience.**

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About USI

Mission & Goals

USI defines industry-wide standards for ***interoperable*** communication between an ***active stylus*** and touch-enabled devices such as phones, tablets, and computing and entertainment platforms

- USI is working to develop and promote a specification for an active stylus
- The specification will define the physical interface and protocol for communication between the active stylus and touch controller
- The goal is to enable **interoperability** between solutions from different manufacturers and to **enable new feature**s/functionality of active pens, over currently available active pens
- Compatibility with common operating systems

Milestones and Status

- USI “Pre-work” started in Q4 of 2014
- Strong interest and WG participation from all members for this initiative
- Closed all initial member agreements and IPR in Q1 in advance of public launch
- Closed USI scope and requirements in Q1
- Universal Stylus Initiative (USI) announced† and officially launched in April 2015
- The current target date for the specification is Q4 of 2015

USI kick-off	Q4 2014
Operations and founding members established	March 2015
Technical Working Group scope, requirements and spec outline complete	March 2015
Public Launch	April 2015
USI welcomes organizations to join	April 2015
USI 1.0 specification targeted release date	Q4 2015

Founding Members

禾瑞亞科技股份有限公司
eGalax_eMPIA Technology Inc.

Growing Membership

Technology Overview

USI Goals and Non-Goals

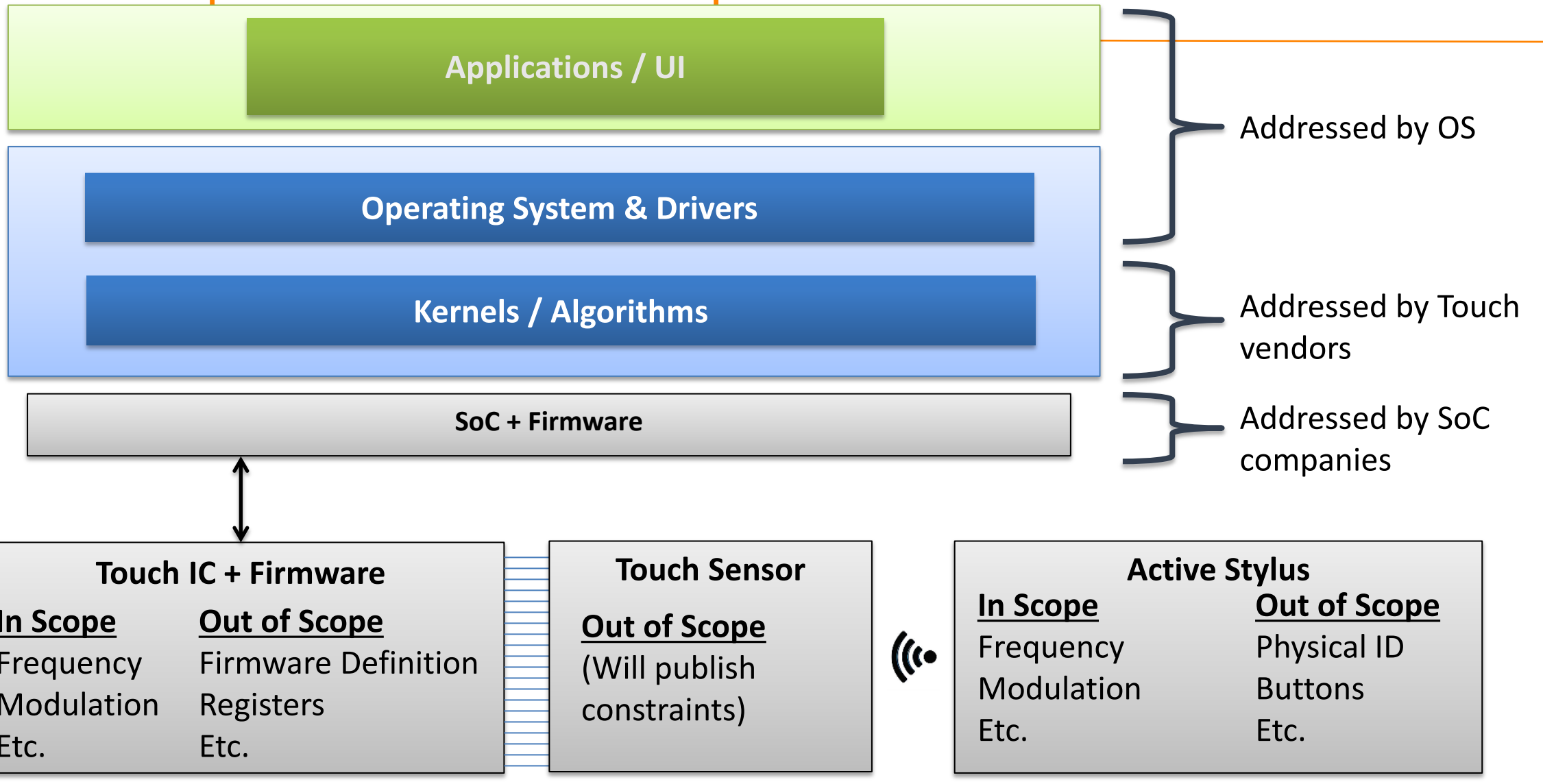
Areas to Standardize:

- Common discovery mechanisms
- Common packet formats to communicate key information (such as pressure, button info)
- Allow low-cost as well as high-end premium implementations
- Support legacy/proprietary co-existence
- Support vendor extensions

Not specified by USI:

- Physical pen industrial design
- Pen look and feel
- Internal hardware/firmware implementation of Touch IC or Pen
- Specific sensor technology
- OS/Applications pen data access API

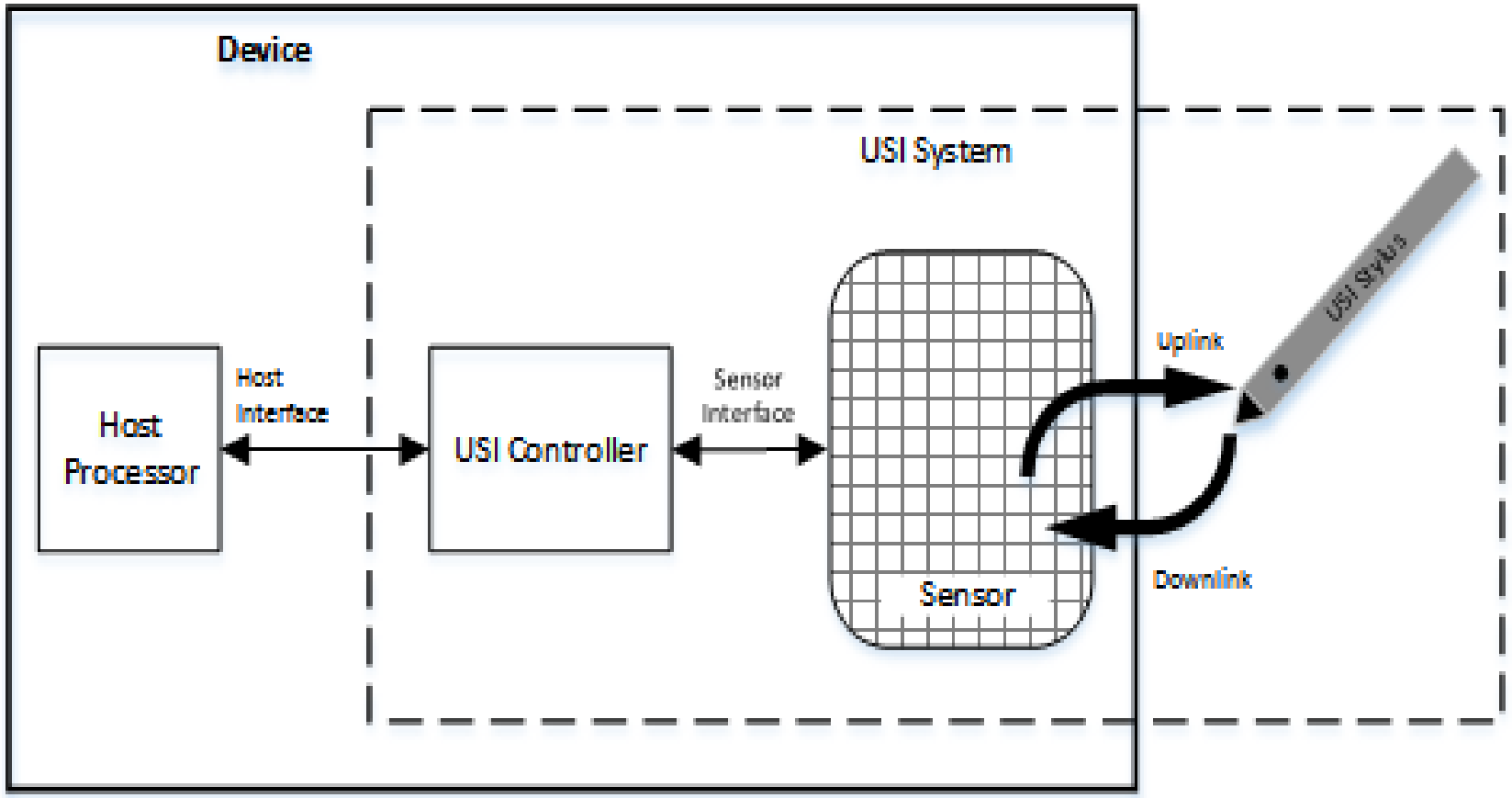
USI Specification Scope



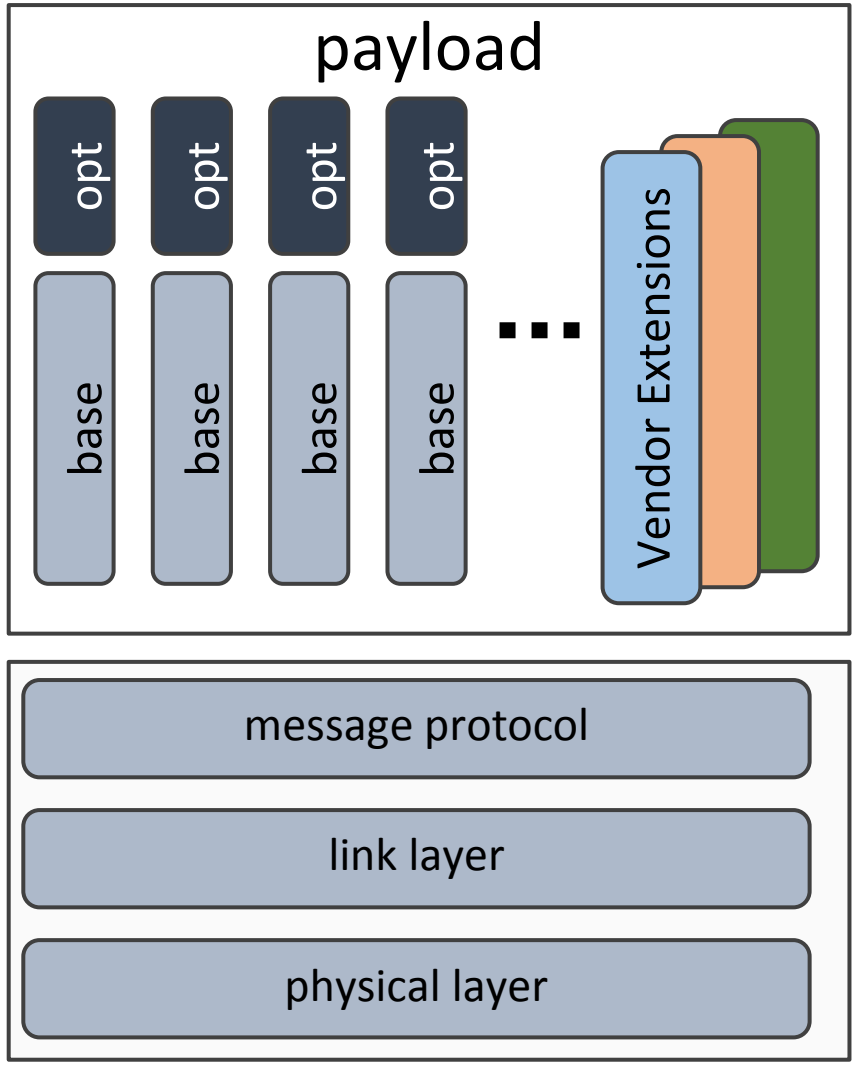
Use Case Assumptions

- Single Stylus / Single Device
  - Writing, Annotating, Drawing, Signing & Gaming
- Simultaneous Stylus & Touch
  - Drawing, Reviewing & Annotating etc
- Single Stylus / Multiple Devices
  - Moving from device to device
- Multiple Styluses / Single Device
  - Collaboration & Gaming
- USI and Proprietary Stylus

Basic Concepts

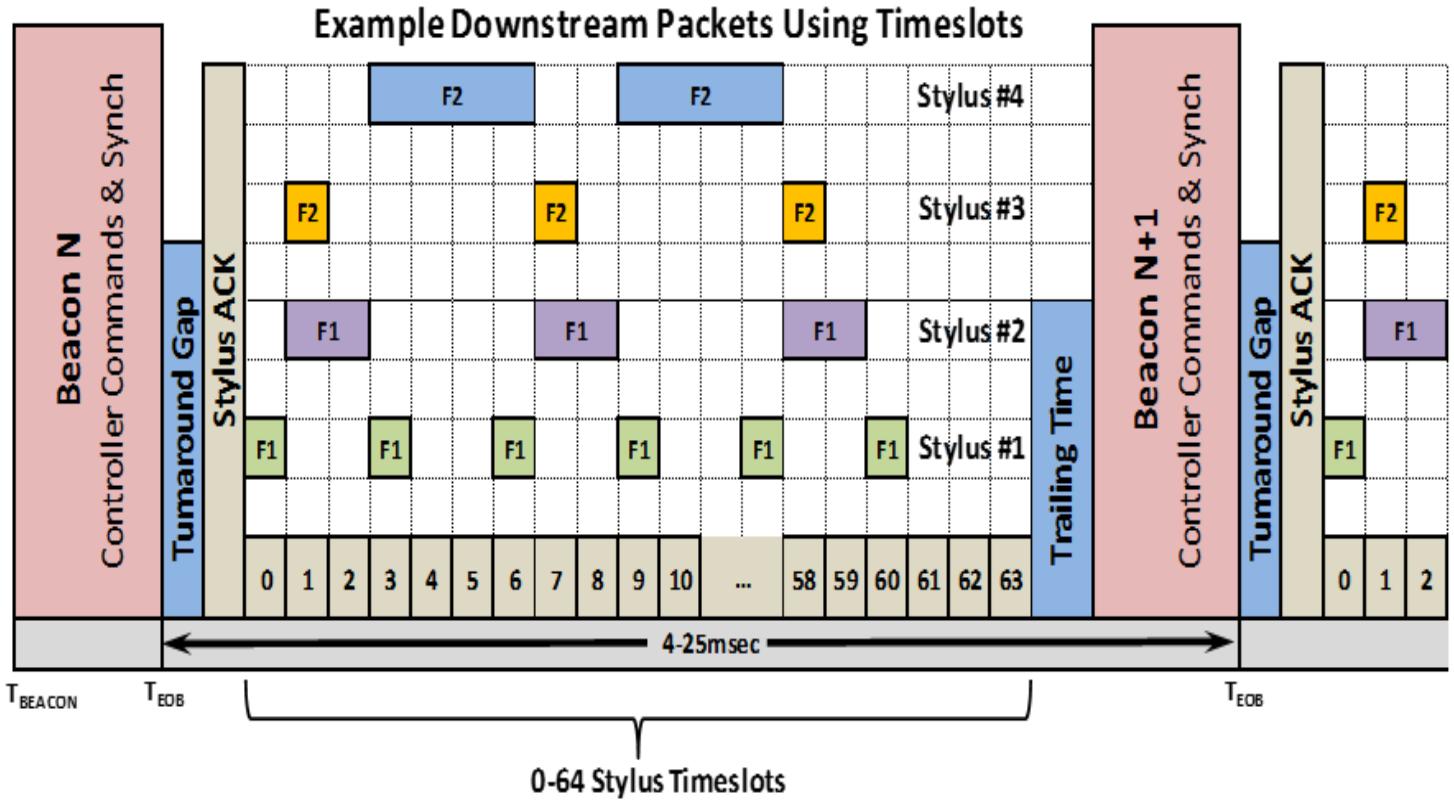


USI Specification - Architecture Blocks



- Current architecture defines communication between active stylus and touch controller for capacitive touch systems
- Two-way communication is defined
- Physical Layer defines the frequency selection, modulation, timing etc
- Link Layer defines the communication protocol and exchange of the information
  - Packet types, format, ID etc
- Vendor extensions are allowed as part of the protocol

Physical Layer - Communication



- Timing synch using a beacon signal by touch controller
- Unpaired stylus responds immediately with Ack
- Paired stylus responds in allotted time and frequency slots
- One stylus can take more than one slot
- Typical slot time 250us

Communication uses both frequency and time division multiplexing

Proprietary Support

		Tablet/Smart Phone/Notebook/AIO		
	Mode	**Proprietary**	**Proprietary + USI**	**USI Only**
Stylus	**Proprietary**	N/A	**Proprietary Mode**	Not discovered
	Proprietary + USI	**Proprietary Mode**	**USI Preferred**	**USI Mode**
	USI Only	Not discovered	**USI Mode**	**USI mode**

- Proprietary assumes the compatible implementations on both sides. If there is an incompatible proprietary implementation, then only USI (if available on both sides) will work
- USI mode also supports vendor extensions within the standard protocol, and does not require switching to Proprietary mode

More to do…

User Expectations

- More natural input
- Best pen on paper feel
- Expect Ink to “flow” out of pen tip (Requires Lower Latency)
- High accuracy & linearity

Our Goal: Deliver best paperless Stylus experience across all devices

Natural interaction

Un-natural interaction

Natural interaction

Additional Requirements

- **Fluid** Digital Inking → same **Natural experience** as writing on paper
- **Improved Algorithms** for Palm Rejection and Handwriting Recognition to enhance pen-based usages
- Inking/Writing as the **'first-class' input** mode for OS
- Natural stylus **input for applications** (Write directly to apps)
- Writing/Inking strokes for **authentication and login**
- **Ink to Text** (Convert handwriting to text as you write)
- **Ink to Shapes** (Convert diagrams from free-hand to shapes)
- Touch/Finger/Passive Stylus **Force/Pressure** support

Enable a Great Stylus User Experience & True "Paperless" Environment

Challenges – Pen/Stylus Manufacturer's Perspective

- Transition of in-flight programs to USI compatible designs
  - Mitigation: Support for proprietary styluses while the transition occurs
- Ability to differentiate between IHVs in the ecosystem
  - Mitigation: Vendor extensions to support advanced capabilities for each vendor within confines of USI
- Consistency of performance across different systems
  - Mitigation: USI testing for certification and compliance to standard

Challenges - Touch Manufacturer's Perspective

- Sensor design challenges
  - New sensor technologies such as On-cell and In-cell
    - Mitigation: USI consistent with these sensor technologies
  - Consistency of performance across different sensor types
    - Mitigation: Specify coupling capacitance between pen tips and different types of available sensors
- System noise challenges
  - LCD noise makes picking up stylus signal difficult
  - Charger noise can disrupt stylus communication
  - Improperly located RF components can contribute high noise levels
    - Mitigation: Careful design of uplink and downlink to optimize noise performance

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Join

Membership Benefits

Benefit	Promoter $15k / year	Contributor $8k / year	Adopter $4k / year
Eligible for Board of Directors seat (Board seats are not guaranteed)	✓		
Eligible for Working Group Chair position	✓		
Approval of Final Specifications (Board of Directors only)	✓		
May propose new work streams	✓		
Voting Rights within Working Groups	✓	✓	
May participate in technical, communications and certification Working Groups	✓	✓	
Access to specs and test specs (Adopters will be provided access to V0.7 and later)	✓	✓	✓
May apply for Certification (when available)	✓	✓	✓
May attend special all member meetings	✓	✓	✓
May publicly promote company's involvement in Universal Stylus Initiative	✓	✓	✓

Join Process

- Request and review the membership materials
  - USI Membership Levels and Benefits
  - USI Bylaws
  - USI IPR Policy
  - USI Certificate of Incorporation
  - USI Participation Agreement
- Email your executed Participation Agreement to: usi-membership@workspace.universalstylus.org.
- Invoice will be sent upon receipt of Participation Agreement.
- Active member when fully executed Participation Agreement and dues received by USI.

Additional Sources of Information

- A PDF of the USI presentation at the Intel Developer Forum is available from our Technical Session Catalog: www.intel.com/idfsessionsSF.
- Information available at www.universalstylus.org
- More information can be obtained by sending mail to usi-membership@workspace.universalstylus.org

Thank You!