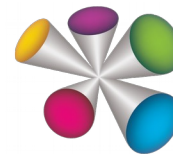


RAPID: Real-time Approximate Ink Display

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Disclaimer

I spend my life working on Xorg and kernel input drivers.

There's an awful lot I don't know about how the graphics subsystems work 🙄



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Issue

Input lag is everywhere

- Brought up several times so far this XDC
- Input, output, and application latency
- Network latency also a potential source

Input lag is noticeable

- Direct-input devices make lag obvious
- Even relatively small levels have negative effects on productivity

Input lag is getting worse

- Major studios are beginning to move to remote/satellite work



GIMP inside GNOME Xorg session on Cintiq Pro 32 (4K / 60Hz). Input driver smoothing disabled

Current Solutions

Hardware

- High refresh-rate displays
- Disable VSYNC
- Dedicated networks

Software

- Input prediction
- Compositor acceleration
- Local cursor

Idea: Basic Inking Protocol

Applicable to local composition

- Application signals intent to use a surface for inking
- Compositor optimizes how it treats the surface (e.g. no buffering or vsync)

Reduces delays from compositor not being set up in an ideal way

Similar to low-latency APIs available on e.g. ChromeOS

Idea: RAPID Protocol

Applicable to local or remote composition

- Application signals intent to use a surface for inking
- Compositor provides optimizations from basic protocol
- Compositor also does its own painting onto overlay plane or framebuffer

Compositor already has access to input events and surface transforms

- Just needs application to supply basic brush attributes

Able to hide both application latency and network latency

Similar to some mobile device APIs that can fast-path input events into ink

Notes: RAPID Protocol

Perfect ink fidelity is not required

- Just providing user feedback about the approximate shape of the path
- Real ink will be showing up in a few dozen milliseconds
- Sequence of “line-to” draws with approximately-correct color and size is fine

Possible Mechanisms

- Damage-erased ink
- Pointer trails



Etcetera

Hunt me down in-person!

Email me: Jason.Gerecke@wacom.com

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