Extreme! IPP over USB

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What is ippusbxd

- Open source ipp over usb driver
- Licensed under corporate friendly Apache 2.0
- Depends on Libusb and posixs networking
- Development as a Google Summer of Code project
- Releasing for Linux soon! Hopefully
- Not to be confused with Mac's ippusbd
What is IPP over USB

- Light weight standard at only 22 pages
- Ratified by USB forum in 2012
- Supported by Mac OSX
- Exposes printer's IPP server
- Can expose printer's embedded web server over localhost
Example Data Flow

Interface #1
HTTP request:  Ippusbxd => BULK OUT => Printer
HTTP response: Ippusbxd <= BULKT IN <= Printer

Interface #2
HTTP request:  Ippusbxd => BULK OUT => Printer
HTTP response: Ippusbxd <= BULKT IN <= Printer

Interface #N
HTTP request:  Ippusbxd => BULK OUT => Printer
HTTP response: Ippusbxd <= BULKT IN <= Printer

Interactions may occur simultaneously
Known Issues

- TCP is connection oriented
- USB has no connections
- TCP has **software** limited connection count
- USB has **hardware** limited interface count
Solution: inspecting sizes

- Driver inspects HTTP message size and knows when interface goes out of use.

  yet

- HTTP has five methods for marking size

- Two of HTTP's methods cannot be supported

- Encryption blocks reading size, cannot be supported

  Not all valid HTTP message are supportable
What the printer should do

• Always use Content-length or Chunked Transfer-encoding for messages with bodys
• Always use full CRLF line endings in headers and chunked messages
• Reject any requests for encryption
• Reject any requests for file application defined message delimiting
Ippusbxid Control flow

Ippusbxid pools interfaces between every request-response cycle

1. Browser connects to ippusbxid
2. Browser sends request
3. ippusbxid acquires USB interface from pool
4. ippusbxid sends request over BULK OUT
5. ippusbxid polls BULK IN for printer's response
6. ippusbxid sends response to browser
7. ippusbxid returns interface to pool
8. Goto step 2

This allows ippusbxid to handle any number of TCP connections
Implementing IPP-USB in printers

- Existing embedded web servers and IPP printer servers will already handle the HTTP handling.
- Depending on implementation details, supporting IPP over USB may be as simple as treating the USB interfaces as always open TCP connections.
Q&A