



Printing with Mobile in Mind

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- **Requirements for printing on mobile devices**
 - Lightweight printing stack
 - No big driver/PPD libraries
 - Starting/stopping daemons on-demand, to save battery
 - No local queues, only network printers
 - No printer setup tool
 - Simple print dialog UI but not dropping essential options
- **All of this is already implemented, only missing part is the mobile print dialog**



Lightweight Printing Stack

- **Do packaging of cups and cups-filters for three printing stack size levels (DONE in Debian/Ubuntu):**
- **Level 1: Absolute minimum stack ~1 MB**
 - Only printing on remote CUPS queues
 - cups: cupsd, libcups2, ipp backend
 - cups-filters: cups-browsed, implicitclass backend
- **Level 2: Small stack ~XX MB?**
 - Printing PDF on remote CUPS queues and IPP network printers which do IPP Everywhere, PDF, PostScript, or PCL
 - cups: Level 1 + libcupsimage2, pstops, rastertopwg
 - cups-filters: pdftopdf, pdftoraster, pdftops, rastertopclx, rastertopdf, imagetopdf
 - Poppler (OR Ghostscript OR MuPDF)
- **Level 3: Desktop stack ~XXX MB?**
 - Printing on any printer which works with Linux
 - Full upstream packages and all drivers and PPDs



Starting and Stopping Daemons on Demand

- **CUPS**

- systemd is the replacement for classic init as PID 1 on all distributions including Ubuntu:
 - CUPS package made ready for on-demand daemon start by Debian's CUPS maintainer
 - On-demand start of CUPS also prepared under Upstart (for current Ubuntu Phone/Touch)
- xinetd on request on port 631 (no socket support, not tested or implemented in a distribution package)
- Added feature to CUPS daemon to auto-stop after on-demand start when idle for a certain time (without jobs).

- **cups-browsed**

- Trigger cups-browsed (and avahi-daemon) by opening print dialog
- Close when avahi-daemon is closed (by the dialog) and the generated queues are removed after having no job any more (or simply the generated queues have no jobs any more).
- Support only for Bonjour browsing, CUPS broadcasting/browsing not needed in mobile environments



No local queues, only network printers

No printer setup tool

- **cups-browsed browses for IPP printers**

- Discover network printers/queues via Bonjour/DNS-SD as this is supported by most printers and networks
- SLP (Service Location Protocol) broadcasts more printer capability info, but is rarely used (obsolete?) and needs directory agent, not used by us.
- Remote CUPS queues
- IPP network printers
 - IPP allows polling capability info, but no polling by cups-browsed to not wake up printers (Poll should be done by print dialog)
 - Known page description languages:
 - IPP Everywhere (PWG Raster), PDF, PostScript, PCL (XL, 5c/e)
 - cups-browsed creates queues with auto-generated PPD or with System V Interface script for the filtering, capability info to be IPP-polled by the print dialog
- Create local queue when printer appears, remove when printer disappears



- **Provide a print dialog as system part, for all apps**
- **Keep it simple (like iOS dialog) ...**
- **... but do not drop essential options**
- **Important options:**
 - Page Size (esp. for photo printing)
 - Paper type or tray
 - Duplex
 - Quality
 - Number of Copies, ...
- **Dialog has to fulfill extra tasks:**
 - On open: Start cups-browsed (and avahi-daemon) to get broadcasted printer info
 - Poll printer capabilities via IPP when user opens option panel or sends job without opening options panel
 - On close: Kill avahi-daemon, which makes cups-browsed go into auto-shutdown mode.



When will it go live?

- **Only part which still needs to get implemented is the print dialog**
- **Planned to be used soon in Ubuntu Phone/Touch.**
- **Support for MuPDF as lightweight PDF interpreter will be added to cups-filters by 2 GsoC students.**
 - Resource saving alternative if Poppler gets completely removed from the system, screen display also by MuPDF
- **Convergence (Phone gets desktop when monitor connected)**
 - Level-2 stack principally works as well on desktop, level 3 can be added
 - When legacy app is started print daemons need to get started and when all legacy apps stopped daemons need to auto-shutdown.