The MPPWG Mobile Phone API

Part I – The Working Group Process

CELF Embedded Linux Conference -- 12 April 2006
Itinerary

• History and background for MPPWG
• Reference Tiers
• The Reference Architecture
• Specification Development Process
• Relationship to Other Organizations
Rationale for Profile Work Groups

• Need to better match the technology program to member companies’ needs and capabilities
  – CELF’s work program had previously been driven from OS technology perspective.
  – Many CELF members are primarily product builders and do not develop OS functionality, but use a distributor.
• Product-side CELF members have the most direct perception of needs for supporting CE product development.
• Domain-centric working groups can be effective drivers for Linux technology for their specific domains.
MPPWG Rationale (1)

- The Mobile Phone domain is a prime domain for CELF – good match of membership with domain
  - Most phone vendors are working on Linux-based products or prototypes.
  - Extensibility and availability of third-party software are increasingly important for phone vendors, especially at the high end.
  - Phone requirements stress Linux in all the areas CELF has identified as central to CE needs and others (like networking bandwidth).
  - The major phone vendors are participating in CELF.
  - Using mobile-phone requirements to identify technology needs common to many CE domains will ensure focus on activities of high value to many members.
MPPWG Rationale (2)

• Many elements of common mobile-phone functionality are not yet available as commercially-qualified open-source components, including such central functionality as browsers.
• Many successful solutions to needs in the mobile-phone domain will also be applicable to other CE domains. The resulting common capabilities will avoid fragmentation and allow vendors to concentrate on differentiating features, rather than on base functionality.
• With a common framework defined, 3rd-party and open-source projects will be able to develop new features knowing that they will plug into multiple vendors’ profile-compliant products.
Charter

• The Mobile Phone Profile Working Group (MPP WG) will develop a reference profile for Linux-based mobile-phones in various functionality tiers.
  – Reference architectures (components and basic structure) for platform and enabling services for specific tiers.
  – The reference architectures provide a framework for identification of performance and functionality needs:
    • Mobile-phone-specific requirements for the base kernel.
    • Mobile-phone-specific requirements for enabling middleware and services supporting horizontal (functionality) domains important in mobile phones (multimedia, Database, etc.).
  – A roadmap for the evolution of the profile, projecting need for additional component technologies.
Scope

- The scope of the MPP WG includes Linux interfaces, middleware, APIs, and component implementations supporting phone-specific functionality tiers.
  - User-level feature functionality and air-protocol support included only as sources of requirements and as plug-in points.
- Where OSS components are not available, the profile may specify plug-in points, such as API definitions, where outside components can be connected to provide needed functionality.
Deliverables

- Requirements (to existing WGs and AG)
- Reference Tiers and Architecture(s) for Linux-based Mobile Phones (to AG for publication)
- Implementations of available Reference Architecture components (to AG for patch tree)
Mobile-Phone Profile Reference Model

Applications (Phone, Browser, JAVA, PIM…)

- Mobile Middleware
  - Carrier Specification Modules (FOMA, Vodafone, i-Mode for overseas…)
- MP-Domain-Specific Middleware
  - Carrier Common Spec Modules
- General purpose Middleware
- Functional-Domain Specific OSS elements.
- Specific Middleware
  - (OCR recognition Engine, Bar code recognition Engine….)

Linux Kernel

Device Drivers (Communication)

- Existing or WG-created OSS implementations
- WG-created or adopted plug-in points for non-OSS elements
- Licensed elements provided by vendor (not in WG scope)

Device Drivers (UI, Multimedia)
Membership and Participation

• Group Membership is broad
  – 77 individuals on mailing list
  – 29 companies on mailing list
• Three 2005 face-to-face meetings, one in 2006
  – Meeting attendance has declined
• Teleconference in January 2006
• First specifications now out for public Formal Review
Members

- 2WIRE
- Agere
- Aplix
- AXE
- ETRI
- France Telecom
- Freescale
- Fujitsu
- IBM
- Intel
- Kenwood
- LGE
- MontaVista
- Motorola
- Movial
- NEC
- Nokia
- Nvidia
- Palmsource
- Panasonic
- Philips
- Renesas
- Samsung
- Sharp
- Sony
- ST
- TI
- Toshiba
- Trolltech
- WindRiver
Reference Tiers and Reference Architecture
# Reference Tiers (1)

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Smart Phone</th>
<th>Media Terminal</th>
<th>Feature Phone</th>
<th>Plain-Old Mobile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Focus</strong></td>
<td>Business focus</td>
<td>Personal/Entertainment Focus</td>
<td>Lifestyle Focus (voice plus social networking support features)</td>
<td>Voice</td>
</tr>
<tr>
<td><strong>Primary Functionality</strong></td>
<td>Full PDA functionality (Calendar, address book)</td>
<td>Strong PIM support, personal content management features</td>
<td>Minimal PIM functionality (phonebook, datebook)</td>
<td>Phonebook and call logs</td>
</tr>
<tr>
<td><strong>Extensibility</strong></td>
<td>Extensible (downloadable features)</td>
<td>Limited extensibility (MIDlets or BREW)</td>
<td>Limited extensibility (MIDlets/BREW)</td>
<td>No extensibility</td>
</tr>
<tr>
<td><strong>Multimedia</strong></td>
<td>Optional</td>
<td>Vido capture support, Media/content players, stereo</td>
<td>Limited multimedia support (pictures, MP3, MIDI,Simple, low-frame-rate animations)</td>
<td>None</td>
</tr>
<tr>
<td><strong>DRM</strong></td>
<td>Optional</td>
<td>Multiple DRM schemes</td>
<td>Hard DRM (limits on copying any media of given types)</td>
<td>None</td>
</tr>
<tr>
<td><strong>Camera</strong></td>
<td>Optional</td>
<td>2-3 megapixel camera</td>
<td>VGA camera or no camera</td>
<td>No camera</td>
</tr>
</tbody>
</table>
## Reference Tiers (2)

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Smart Phone</th>
<th>Media Terminal</th>
<th>Feature Phone</th>
<th>Plain-Old Mobile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Browser</td>
<td>XHTML Browser</td>
<td>XHTML Browser</td>
<td>WAP Browser (text-centric)</td>
<td>Embedded access to specific URLs</td>
</tr>
<tr>
<td>Display</td>
<td>QVGA or larger color display</td>
<td>QSIF or larger color display</td>
<td>QSIF or smaller color display</td>
<td>Small display (64x96), non-color</td>
</tr>
<tr>
<td>Interaction</td>
<td>Touchscreen UI or QWERTY keyboard plus pointing device</td>
<td>Specialized keypad for media/game interaction</td>
<td>Standard keypad plus carrier-specific keys</td>
<td>Standard keypad</td>
</tr>
<tr>
<td>Connectivity</td>
<td>3G connectivity, possibly WLAN, Bluetooth, IrDA</td>
<td>2.5G or 3G connectivity, possibly WLAN; High-speed USB; Bluetooth</td>
<td>2G connectivity; USB or serial cable</td>
<td>2G connectivity; proprietary accessory cable</td>
</tr>
<tr>
<td>Memory</td>
<td>32M RAM, 64M ROM, removable storage</td>
<td>64M RAM, 64M ROM, Hard Disk or large removable storage</td>
<td>16M RAM, 16M ROM, no removable storage</td>
<td>8M RAM, 8M ROM or less</td>
</tr>
<tr>
<td>Processor</td>
<td>120MHz</td>
<td>200MHz</td>
<td>30MHz</td>
<td>15MHz</td>
</tr>
</tbody>
</table>


The Reference Architecture Specification

• A reference architecture is a commonly understood approach to structuring a kind of system
• Intended to lay out the parts of the system so that the implementation and APIs can be mapped to reference components
• Helps clarify what is in-scope
• The Reference Architecture is non-normative – it is meant to provide background and understanding, not to constrain conforming implementations of the APIs
Overall Architecture

- Two domains may be separate processors or share one
- App domain has four layers:
  - Applications
  - Middleware
  - Kernel
  - Drivers and Bridge
- Communication Domain includes air stack and real-time activities
Kernel

• Kernel is standard Linux with embedded patches
  – Boot-time improvements
  – System size reduction
  – Dynamic power management
  – Compressed filesystems
  – Security enhancements

• Real-time support or microkernel may be required if running on single processor
Application Framework

• Provides both application management (launch and communicate) and UI framework

• Reference Architecture does not specify toolkit or rendering components

• MSB provides “event bus”
  – Registration and filtering
  – Event delivery in client process
Telephony Framework

- Provides various kinds of communication services
  - Circuit-switched (voice)
  - Pack-switched (data)
  - SMS
- Also includes handset control functions
  - Lights
  - Ringers
  - Audio control
Multimedia Framework

- Video telephony support
- Audio/video stream management
- Multimedia plugins and rendering
- Multimedia drivers
API Specification Development
Sources

• Working group polled members for reference architecture proposals and contributions of APIs and implementations

• Reference Architecture and API submitted by NEC and Panasonic
  – Based on working implementation for DoCoMo FOMA phones
Specification Development Process

• Draft Development Phase
  – Editors prepare drafts, respond to review comments
  – Face-to-face and e-mail reviews
  – WG polled for approval as review candidate
  – Must have at least 5 supporting members

• Formal Review Phase
  – Available to interested parties
  – All comments must be resolved or rejected
  – Approval vote at editor’s request
  – If approved by WG vote, published as Proposed Specification

• AG Review Phase
  – All AG issues resolved

• Board of Directors Review Phase
  – All Board issues resolved
  – Publication as Approved Specification
Specifications in Formal Review

• Four documents released for Formal Review:
  – Reference Architecture (Motorola)
  – Preface (Aplix)
  – Circuit-switched Communications (Aplix)
  – Packet-switched Communications (NEC)

• Reviewer sign-up and comments submission via the MPPCOMMENTS mailing list at list.celinuxforum.org
Specifications in Development

• Partially edited and awaiting review
  – Short Message Service (MontaVista)
  – Equipment Services (ETRI)
  – Lighting Services (NEC)

• Supporting non-Specification (not advancing)
  – Programming Guide

• Not yet underway
  – Six additional Telephony sections, Multimedia, Other Services, and Application Framework API
Formal Review Process

• Issue call for reviewers
  – Invite CELF members, LiPS Forum, MLI, others
  – Public announcement on home page calling for reviewers

• Review period runs 1 March – 23 April
  – Reviewers register with MPPWG and submit comments
  – Reviewers are individuals not companies

• Comments resolution period runs as long as necessary
  – Editor can request vote when comments all resolved or rejected

• WG votes on approval at request of Editor
  – One vote per WG-member
  – Two-week e-mail voting period
  – Approval requires at least 5 supporting votes, and at least 75% of votes cast

• If approved, publish as Proposed Specification and send to AG
Comment Submission

- Reviewers send registration and comments to: MppComments@list.celinuxforum.org
- Comments submitted in template spreadsheet or XML template
- Document Editor incorporates submissions into master tracking sheet
- Spreadsheet will be attached to MppApiIssues page in Public wiki
  - Tracking spreadsheet is visible to reviewers and WG
Comment Resolution

• Document editors will manage issue resolution for their chapters
  – Editor tracks comment responses in comments spreadsheet
    • Enters proposed response in spreadsheet (accept fix, apply different fix, reject issue)
    • Leads review by WG and comment submitters
  – Editor can make non-substantive (language, etc.) changes to improve document *ad lib*

• All comments must be addressed (accepted or rejected)
• Editor must verify resolutions with reviewers who raised them
• Editor periodically prepares updated drafts with list of CRs resolved
Reference Implementation

• Strong preference by Architecture Group for having a working implementation before approval

• Alternatives include:
  – Form an OSS project to build a reference implementation
  – Cooperate with outside party
  – Refer to existing commercial offering as proof-of-feasibility
  – Could be built on top of some existing reference stack
Other Organizations
LiPS Forum

- Linux Phone Specification Forum launched in November
  - Carrier-centric mission to produce consistent API across handset and “converged device” manufacturers to enable carrier customization
- Has drafts of reference model and is working on event model
- Scope is similar to MPPWG (middleware/application services API) plus broader support program (conformance tests, etc.)
- Some cross-membership with CELF
OSDL Mobile Linux Initiative

- OSDL has chartered an initiative to promote Linux improvements for mobile-device applications
- Scope is similar to the other (non-MPPWG) parts of CELF
- Significant cross-membership with CELF and with LiPS Forum
- MLI is still working out the details of its work program and goals; focus is narrowly mobile, rather than all of CE
LiPS Forum Interaction

• Working with LiPS Forum to set up a liaison relationship, to avoid fragmentation
  – MPPWG chair has attended LiPS technical meetings as observer
  – LiPS has supplied working documents (reference model) and comments on draft of specifications

• LiPS Architecture WG Leader is on our mailing list as invited member of the MPPWG
  – Met with us at February face-to-face

• Planning to meet jointly in May, at OSDL face-to-face
OSDL Mobile Linux Initiative Interaction

• MPPWG Chair participating in bi-monthly teleconferences with MLI
• MPPWG participated in a joint face-to-face meeting hosted by the MLI in February; will also participate in May face-to-face
  – LiPS Forum also participant in these events
### Comparative Scope (Source: LiPS)

<table>
<thead>
<tr>
<th>Organisation Description / Objectives</th>
<th>LiPS</th>
<th>CELF / MPP WG</th>
<th>OSDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistent deployment of UX, apps and services across all phones</td>
<td>Consistent services base for application deployment across mobile phones</td>
<td>Promotion of Linux in all commercial environments (servers to terminals)</td>
<td></td>
</tr>
<tr>
<td>All telecom terminals (Fixed, Mobile, Converged)</td>
<td>Mobile Only (Other parts of CELF cover other devices)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Phone Focus</td>
<td>Driver</td>
<td>LiFE Community H/W Manufacturers</td>
<td>Linux Community</td>
</tr>
<tr>
<td>Deliverables</td>
<td>Telecom Operators</td>
<td>- Reference Architecture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Requirements by profile</td>
<td>- Middleware APIs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Application &amp; Service enablers</td>
<td>- Vertical approach</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- User experience</td>
<td>- Combination of low and high level components</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Tools</td>
<td>- Kernel optimisation</td>
<td></td>
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<tr>
<td></td>
<td>- Testing &amp; certification</td>
<td>- Silicon integration</td>
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<tr>
<td></td>
<td></td>
<td>- OS Services</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Testing and certification</td>
<td></td>
</tr>
</tbody>
</table>
LiPS/CELF Overlap (Source: LiPS Forum)

Requirements & Protocols
OMA, OMTP

Linux Kernel

Apps

Application SDK
IDE

Application Services

OS Services

Drivers and Stacks

Silicon

12 April 2006