
The Mobile-Phone Domain and CELF

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Motorola Mobile Devices
Linux OS Development

linux in mobile phones

- First Linux-based phones introduced in 2003, in Asia
- Recent prediction that 204 million Linux handsets will be sold in 2012 [ABI Research]
 - “It’s not a question of whether, but when”
- Motorola has said that it will use Linux in much of its product line

why linux?

- Access to new technology development
- Access to talent
- Solid technology to build products on
- Ability to configure for small systems while retaining real-system capabilities
- Ability to modify to suit needs

- Cost is a secondary driver – reduces per unit cost, but still carries substantial development cost

the extended community

- Companies using Linux have formed a number of initiatives to support collaborative participation in the Linux community
- Key drivers:
 - Capabilities – features, enablers, middleware
 - Characteristics – performance, size, boot-time, real-time
 - Consistency – avoid fragmentation
- CE manufacturers need to differentiate, but don't want to have to port every supporting technology

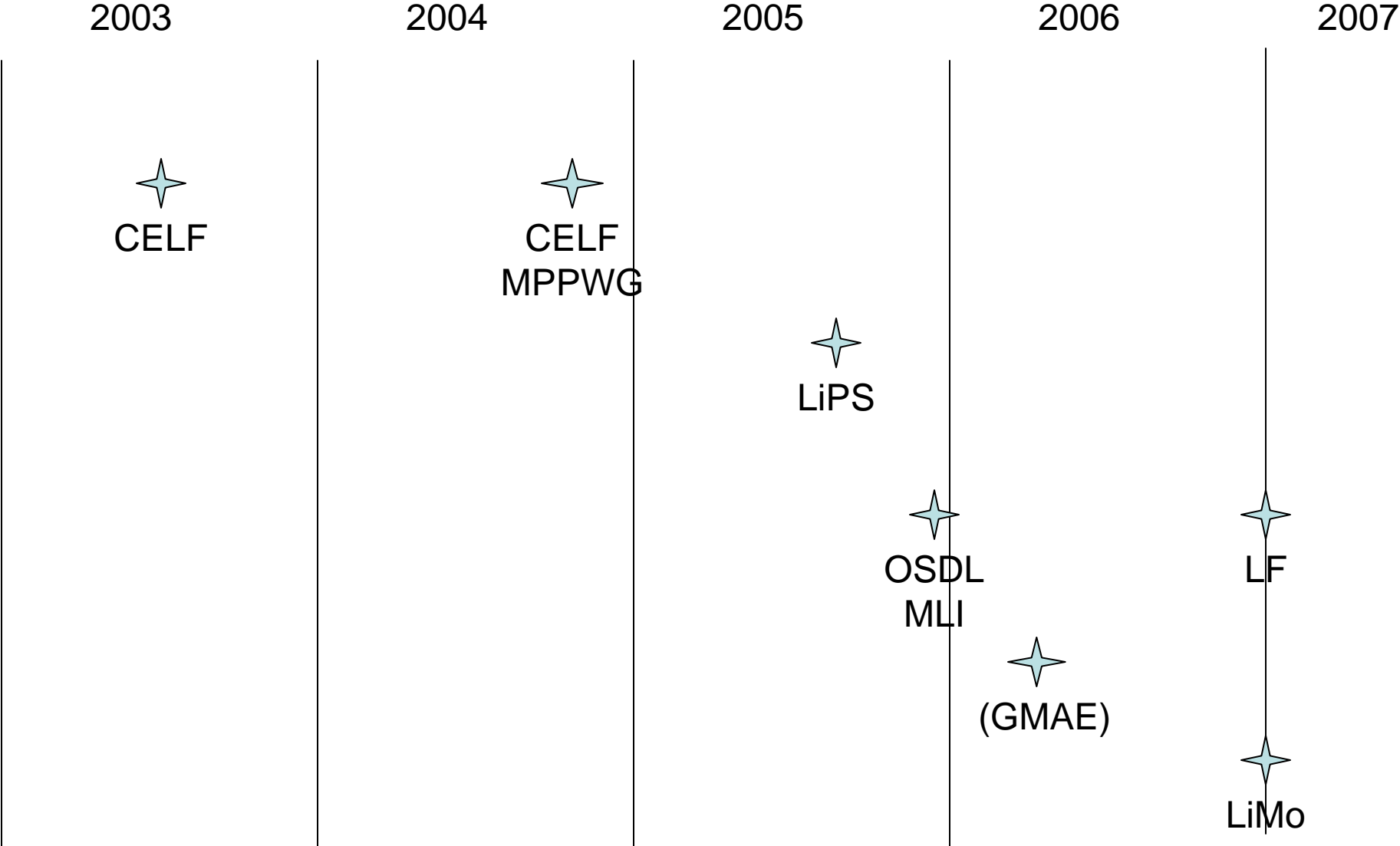
the players

- There are four major industry forums in the mobile-phone Linux space:
 - Consumer Electronics Linux Forum (CELF)
 - Linux Foundation
 - Linux Phone Standards Forum (LiPS Forum)
 - Linux in Mobile Foundation (LiMo)
- And, several key FLOSS projects
 - GNOME Mobile And Embedded Initiative (GMAE)
 - OpenMoko
- And a growing number of software efforts, under various licenses – Trolltech's GreenSuite, Access's ALP, Palm's new Linux-based platform, and others

the field has changed

- Since the last ELC the list of players has changed significantly:
 - OSDL and the Free Standards Group merged to form the Linux Foundation
 - major vendors and carriers joined to form the LiMo Foundation
 - OpenMoko is a pure FLOSS project
 - Several proprietary frameworks have been open-sourced (e.g., Access's Hiker application framework)
 - Palm has announced a plan for a Linux platform
 - Nokia has added a compatibility layer to allow Linux apps to run on top of Symbian

timeline



ce linux forum

- CELF was formed in 2003 to promote use of Linux in consumer electronics devices
 - Sony and Matsushita were primary founders
 - 50+ members in all; worldwide, with strong Asian core
 - Focus is CE device manufacturers and their suppliers
 - Lots of member overlap with LF, LiPS Forum, and LiMo
 - Formed Mobile Phone Profile Working Group in 2004 to identify and pursue the needs of the mobile-phone domain

ce linux forum (2)

- CELF activities include:
 - Sharing of patches and knowledge
 - Organizing technical meetings for sharing – Embedded Linux Conference and regional “jamborees”
 - Test Lab providing remote access to embedded target boards, builds, and tests
 - Sponsored developers working on mainstreaming member patches and specific Linux improvements
 - Mobile Phone Profile Working Group (MPPWG), working on reference architecture, requirements, and components for handsets
- <<http://www.celinuxforum.org>>

linux foundation

- The Linux Foundation's mission is to Protect, Standardize, and Promote Linux
 - 80+ members, worldwide
 - Most background in enterprise/desktop Linux
 - Home of the Linux Standard Base specification and its test suite
 - Linus Torvalds and Andrew Morton work for LF (but not controlled by LF)
- Significant cross-membership with CELF and LiMo, less with LiPS Forum
- Major reorganization in December 2006, leaving work program TBD
- Previous Mobile Linux Initiative now potentially a working group within Linux Foundation
- <<http://www.linux-foundation.org>>

lips forum

- Linux Phone Standards Forum launched in November 2005
 - France Telecom/Orange was primary founder
 - 23 members; worldwide, with European core; mostly semiconductor and software vendors
 - Carrier-centric mission to produce consistent API for application building and customization across handset and “converged device” manufacturers
- Has drafts of reference model and is working on APIs in specific functional areas
- Scope is similar to LiMo (middleware/application services API) plus broader support program (conformance tests, etc.)
- Some cross-membership with CELF, none with LiMo
- <<http://www.lipsforum.org>>

limo foundation

- LiMo Foundation formed in December 2006
 - Founding members Motorola, Samsung, NEC, Panasonic, DoCoMo, and Vodafone
 - Goal is complete ecosystem for mobile software, on Linux/OSS base
 - Just beginning to recruit additional members
- Semi-open-source model
 - Platform contains many FLOSS components
 - Members contributing additional frameworks and components and the effort to integrate them
 - Foundation software uses own license (open among members)
- High membership fees, covering right-to-use foundation-owned software assets
- <<http://www.limofoundation.org>>

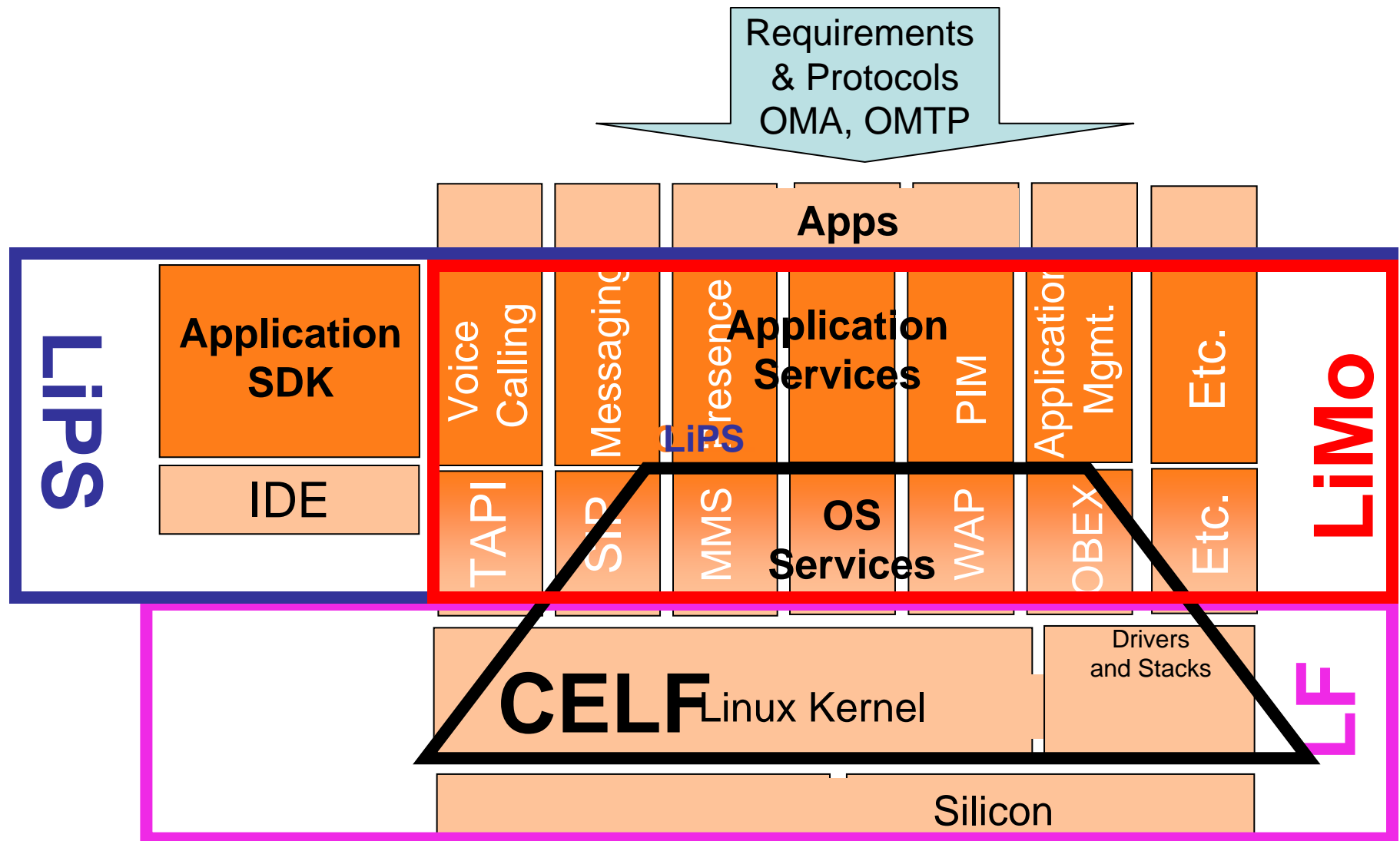
interactions

- The organizations are aware of each other and actively trying to cooperate
 - All avow goal of not fragmenting the industry
 - All avow goal of not forking Linux
- CELF, Linux Foundation, and LiPS Forum have had several joint sessions, teleconferences, and cross-organization presentations
- CELF MPPWG and LiPS Forum were working towards joint development of middleware APIs, before CELF exited API development
- MLI was working to get requirements from MPPWG and LiPS Forum; not clear whether that's a Linux Foundation mission

comparative scope

	LiPS Forum	CELF MPP WG	LF	LiMo
Organisation Description / Objectives	Consistent deployment of UX, apps and services across all phones	Making Linux a better platform for consumer devices	Promotion of Linux in all commercial environments	Consistent deployment of UX, apps and services across all phones
Scope	All telecom terminals (Fixed, Mobile, Converged)	CE Devices, including Mobile Phones	Servers, Desktop, Embedded, Mobile	Mobile Phones
Driver	Telecom Operators	H/W Manufacturers	Users, Vendors, Developers	Operators and Vendors
Deliverables	<ul style="list-style-type: none"> - Requirements - Enablers - Tools - Testing & Certification 	<ul style="list-style-type: none"> - Reference Architecture - Technology Enhancements - Components 	<ul style="list-style-type: none"> - Requirements - Standards - Tests 	<ul style="list-style-type: none"> - Components - Architecture - Tests - Testing * - Certification

organization overlap



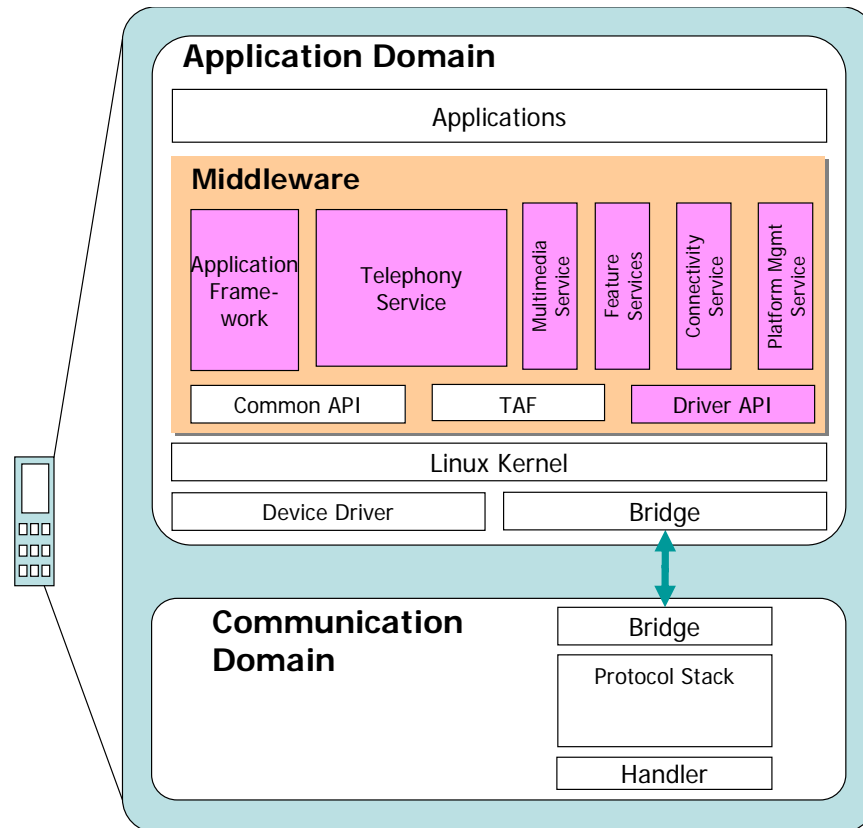
openmoko

- OpenMoko was launched late in 2006 as an effort to build a completely free mobile phone stack
 - Open software except for GSM stack implemented in independent hardware device
 - Development hardware base is Neo1973
 - Supported by FIC Inc.
- A community-style, code-centric project
- Scope is complete phone functionality – applications, middleware, etc.
- <http://www.openmoko.org>

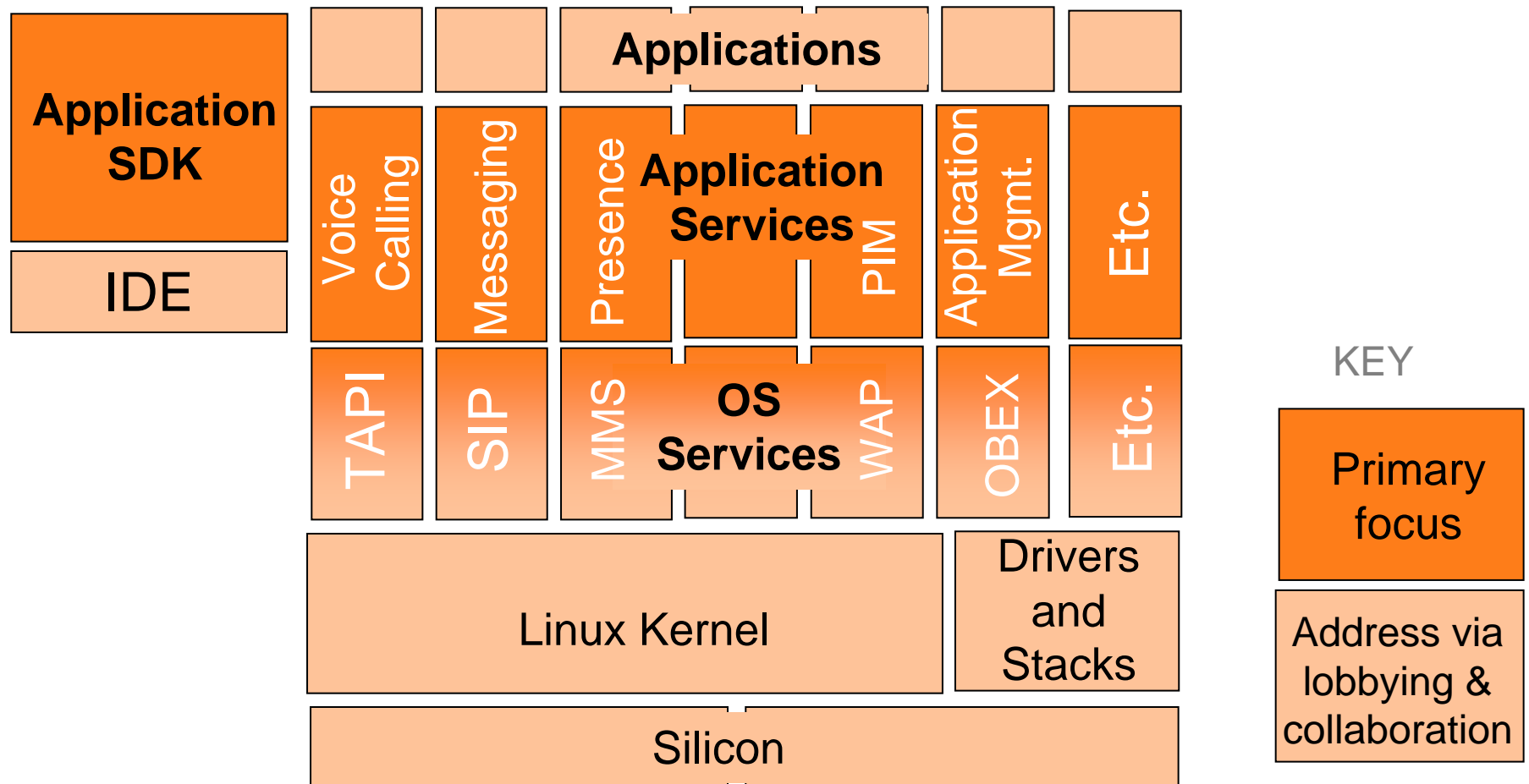
gnome mobile and embedded initiative

- New effort within the GNOME community to address mobile/embedded domains
 - Introduced at GUADEC 2006
 - Formal announcement today
 - Support from wide range of companies, projects, and forums
- Focus on building mobile/embedded platform around the GNOME components (continue drive for world domination)
 - Scope is the user-experience stack
 - Platform components are already in wide use in other platforms (GTK+, BlueZ, Gstreamer, etc.)
- <<http://www.gnome.org>>

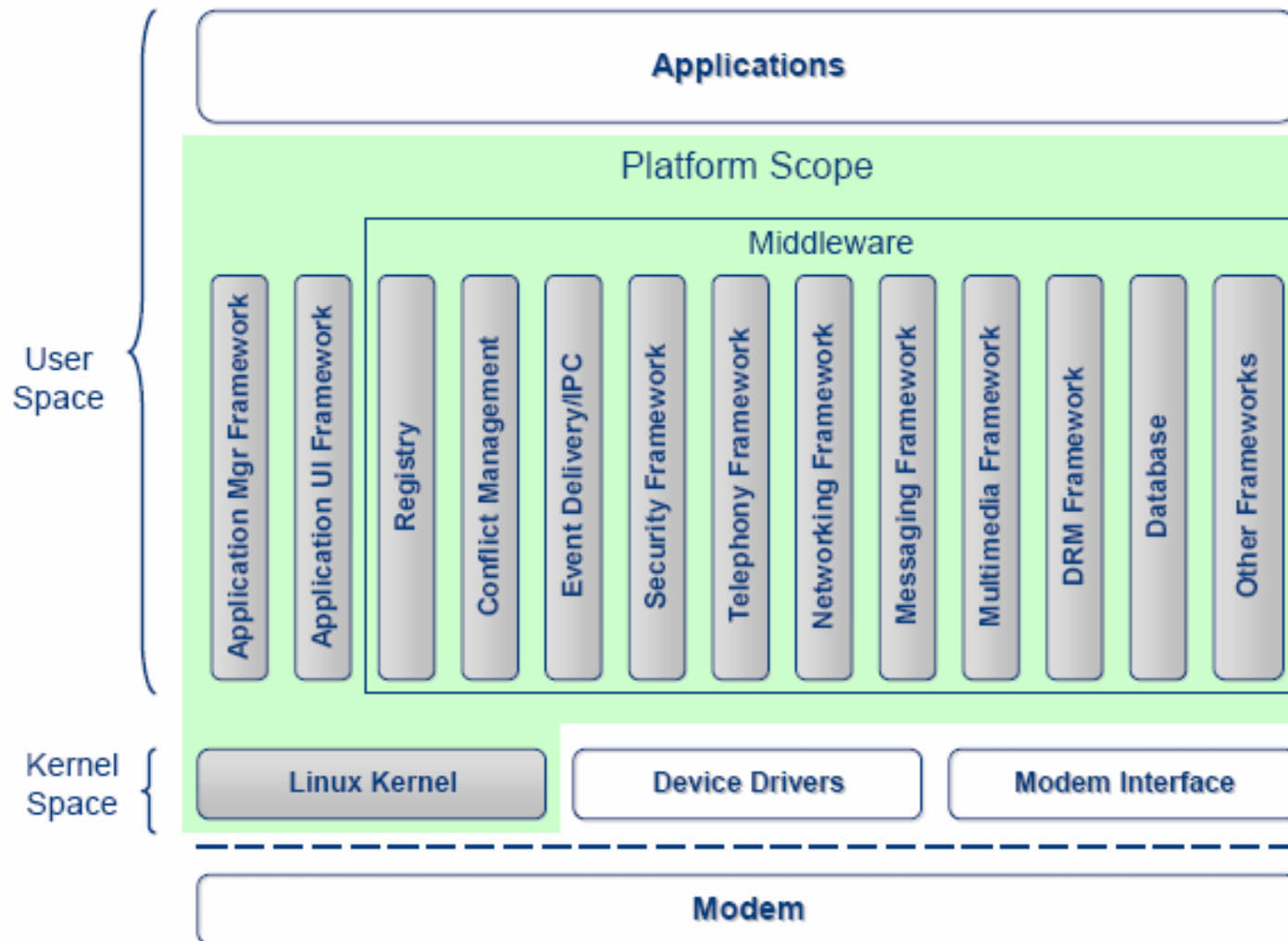
mppwg reference architecture



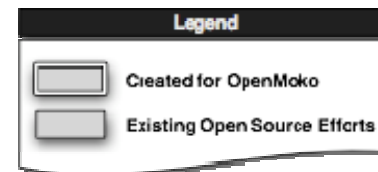
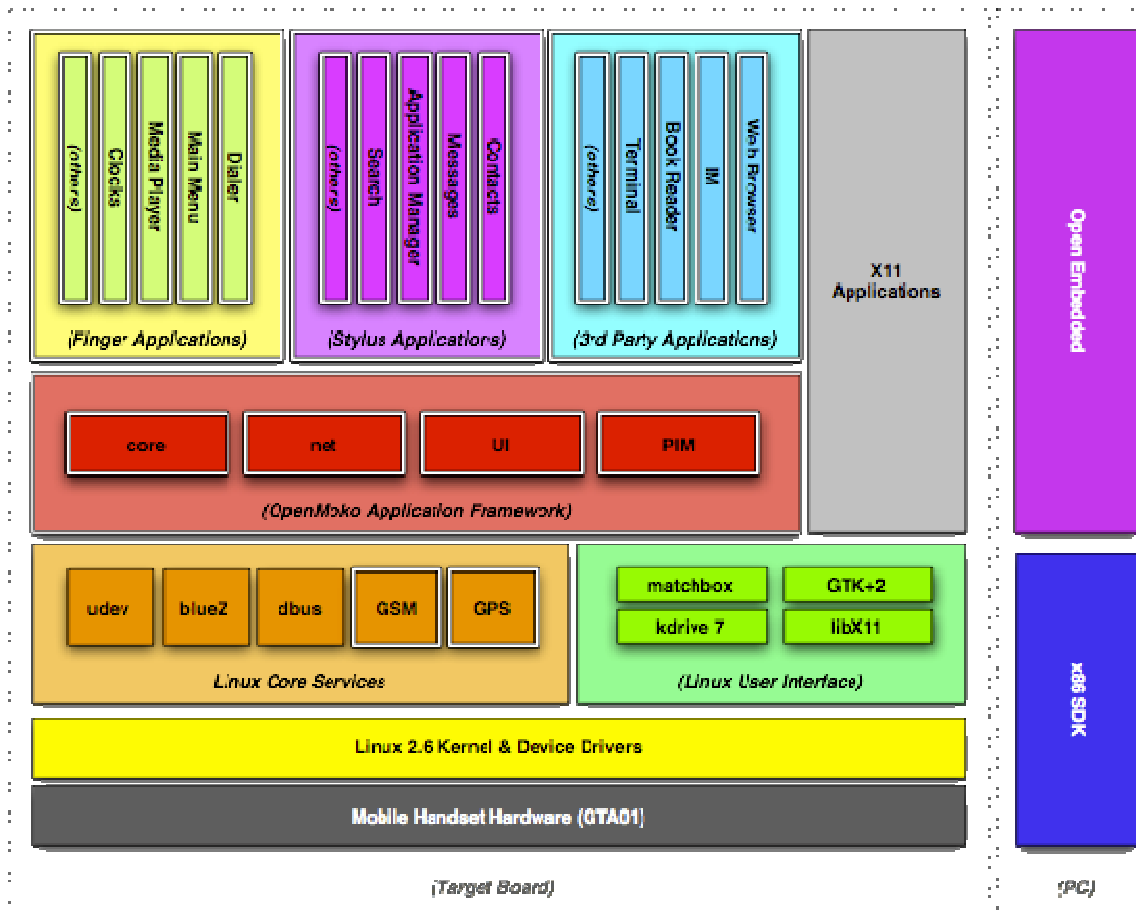
lips reference model



limo architecture



openmoko software stack



how things could fit together – lower levels

- There is a possible natural fit among the forums that would minimize fragmentation
 - CELF MPPWG
 - Kernel/low-OS technology enhancements for mobile domain
 - Central channel for mobile technology requirements
 - Linux Foundation
 - Focus on testing, standardization, conformance for specialized profile
 - Channel for conformance requirements
- Cooperate on marketing, education, collaboration

how things could fit together – upper levels

- At the upper levels commercial issues may get in the way...
 - LiMo Foundation focus on middleware, enablers, and frameworks below the application/UI layer
 - LiPS Forum focus on the application/UI layer frameworks and toolkits
- Cooperate on aligning standards, conformance testing, SDKs
- This alignment would meet many of the goals of the individual organizations, while avoiding direct competition (and fragmentation)
- I'm an often-frustrated optimist...

**the celf mobile-phone profile
working group**

the role of celf working groups

- Provide focus for member activities in given area
- Catalog and prioritize related community and member projects and requirements
- Develop CELF specifications and propose to AG
- Solicit implementations, review, and recommend to AG
- Report to AG and Forum on “state of Linux” in given areas
- May involve non-CELF experts in work as appropriate
- Chair represents the technical area with other forums, OSS projects, etc.

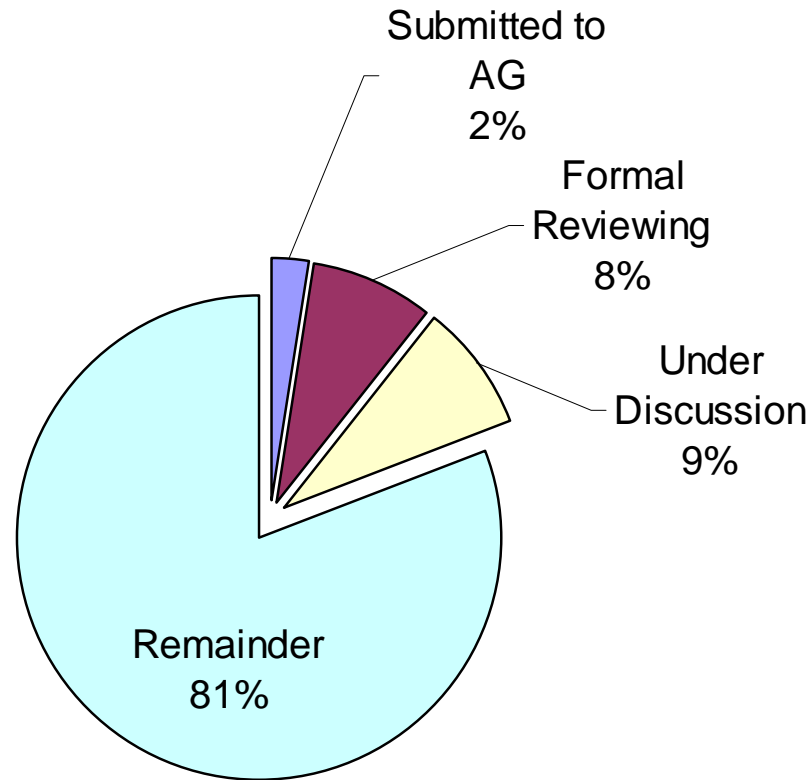
the celf mobile phone profile working group

- MPPWG is one of two domain-oriented working groups formed in October 2004 to provide a forum for collaboration in a particular domain
 - Belief that domain participants would be best source for requirements and technology
 - Goal to deliver a domain profile, reference architecture, component-use profile, gap analyses, etc.

api specification development

- MPPWG members decided the highest-impact deliverable would be a common API for mobile-phone functionality, as an aid to adoption
- Panasonic and NEC offered the API used in their DoCoMo FOMA phones
- The WG began work on a subset of the 1500-page API specification
- After two years of work, Reference Architecture and three spec sections proposed to AG and work begun on converting to a sourceforge project

progress of api development [panasonic]



re-direction

- The AG and Board reviewed progress in January and determined that the slow progress and narrow focus made it unlikely the API would be accepted by community, recommended dropping the effort

new program of work

- Continue Reference Architecture, profiling activities
- Foster technology innovation for mobile use of Linux
- Build list of key enhancements, projects, components, and member contributions
- Be the channel for mobile Linux requirements
- Provide domain-specific input to the other WGs
- Collaborate with other WGs to get phone-specific enhancements into base
- Collaborate with other industry forums in the mobile space

invitation

- The MPPWG is looking for people to participate in these activities!
 - It is possible for non-CELF members to participate in WG activities, at the Chair's request
 - Always open to input (<mailto:preece@motorola.com>)
- Also, there will be an opportunity to discuss the WG's work at the BOF tonight – 7:30 in room A