Standardisation Strategies for the Android Value Chain:

Politics of the Stack

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Abstract— **The mobile landscape has changed forever with the advent of a truly successful open source mobile platform: Android. This paper illustrates how Android has redefined bargaining relationships within the mobile platform industry. Despite the open source nature of Android, many companies have difficulty influencing the direction of the platform. Android, however, can be viewed as supply chains of software, formed from many open source projects Google integrate to produce Android. This paper identifies leverage points within this supply chain and concludes with an examination of the strategies companies may use to influence Android.**

Keywords-component; Standardisation, platforms, open source, Android, value chain, mobile devices

I. INTRODUCTION – THE IMPACT OF ANDROID

Despite rapid changes within the mobile handset industry since the first phase of GSM in 1990, the supply chain has remained relatively stable even if the technologies have not. Handset manufacturers were traditionally system integrators working with hardware and some small amount of software. Manufacturers developed Requests For Information (RFIs) or Requests For Quotes (RFQs) towards component and operating system (OS) suppliers. Based on well-established decision-making processes within each company, an OS or particular semiconductor was selected. This system was based on the traditional R&D regime within the mobile device industry: release schedules planned at least 12 months in advance. Suppliers had a reasonable ability to inform device manufacturers of their plans. Moreover, much of the handset platform was decided in telecommunications standards forums such as 3GPP, etc… which represented traditional bargaining relationships between operators, network vendors, consumers and handset manufacturers.

The release of Android changed all that and raises a series of new issues for the mobile device manufacturers. Android allows them to reduce the cost of device development and leverage the Android name currently fashionable with end-user consumers and developers. Google, however, are not a traditional supplier.

The nature of an open source project means that release schedules are reasonably fluid, to some extent driven by the needs and wants of the community involved. It is therefore not possible for a manufacturer to request a release schedule for features on such a platform. The bargaining relationships around Android itself, however, are even more complex. While it is touted as an open source platform, Google retain significant control over the code base, viewing it as a closed project and deciding the final functionality of the platform.

The complexity continues when the entire Android stack is considered. Android is not built entirely by Google –several other open source projects are combined into a bundle that is then released under the Android name. The Android stack may therefore be viewed as a form of software supply chain. A key question for device manufacturers has become – where in this supply chain can they exercise control in order to ensure their technology and product decisions are represented in the Android platform? In short, how do they best evolve their standardization strategies from those appropriate to telecommunications to reflect this new type of software supply chain?

II. THE ANDROID VALUE CHAIN

A. New technology, new relationships

The latest release of Android is considered to be a closed project between Google and a number of selected partners that are carefully selected based on the goals for the next release of the platform. For example, NXP has been working closely with Google to get NFC included in the stack. NFC requires both hardware (chipset) and software that is included in the operating system. Companies such as NXP that wish to have a prime negotiating position within the handset supply chain must participate within the Android development process in

order to be able to supply both hardware and software to its customers.

Companies not selected by Google as part of the inner circle of platform definition must instead engage in projects up-stream of Android. A company's method of participation in Android is therefore becoming as important as selecting the right standardization forums were previously. In an additional twist, the Android platform is a fluid construction – parts of the platform deemed not up to par may be completely re-written or simply replaced by a different open source project between releases.

B. Hardware Integration

Platforms for mobile handsets have evolved substantially over the last few years from traditional engineering manufacturing process to by supply chain management of a network of third parties [1]. This can quite easily be achieved when the middleware is Android it is applicable to a number of chipsets used in Android devices. This has a major impact on how companies develop products, the core competencies and the value provided to end-user consumers.

Hardware capabilities are an important driving mechanism for uptake by technologically savvy early adopters. Strategic partnerships between device manufacturers and chipset vendors are increasing in importance in order to be first to market with the absolute latest technology - these chipsets must be supported by Android, however.

C. Operators

Prior to the iPhone and Android, mobile operators dictated product requirements to handset manufacturers – final requirements for handset functionality were articulated in standardization forums [6]. This level of control was based on operators' sales channels. With Android, the situation has changed as the major developer of the platform is no longer a device manufacturer. The open source nature of the Android platform means it can to be inspected in detail by operators, which was unheard of just a few years back. With detailed knowledge of what can and cannot be done in the platform, operators can place very detailed requirements for changes they would like to see included by device manufacturers. Consequently, any customisations made to the platform that are not included in the main branch need to be independently maintained by the device manufacturer, which reduces the usefulness of an open platform. There is a major risk that the device manufacturer finds itself in a situation where it needs to back-port its patches and changes to every new version of the platform. It is therefore important for handset manufacturers to be able to include changes in the Android stack. Understanding the strategies for doing this is therefore very important.

D. Handset Manufacturers

In order to influence a project such as Android, both dedication and technical expertise are important. Handset manufacturers need to change their mindsets from manufacturing and supply chain management to one where employees work with full focus on open source activities. In contrast to the traditional standardization processes, tasks will often create functionality for the greater community, rather than just the handset manufacturer.

Bargaining relations between technology providers and vendors have therefore changed. Source of frameworks, stacks and other technologies are now for everyone to see. A fine balance needs to be struck between what is provided openly and those parts that represent a competitive advantage to keeping closed.

E. Paper Development

The final paper will provide a detailed analysis of the open source landscape of the Android platform, how bargaining relationships are being shaped as well as changes required moving from hardware to a software supply chain. Standardisation strategies for handset manufacturers will be presented.

Fig 1 illustrates some of the open source projects in Android. In the final paper, this will be represented as a software supply chain and its interactions with e.g. operators. Table 1 highlights some of the corporate participants in the larger open source projects that form the supply chain. Table 2 illustrates the different foras responsible for the delivery of codecs.
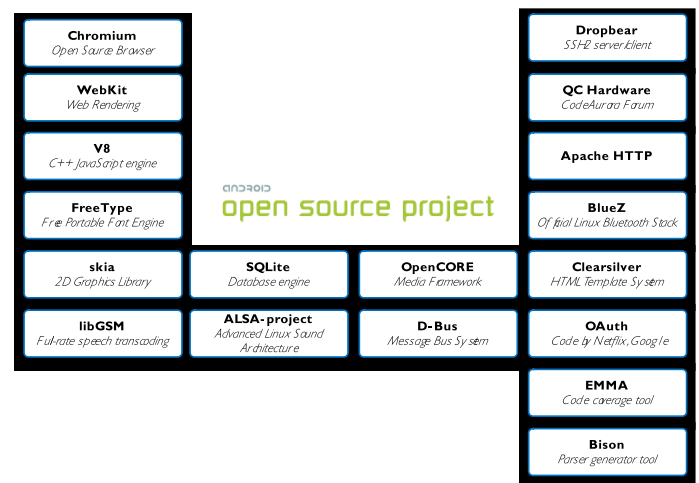

Figure 1. Open Source Components of Android Platform, Source: authors

TABLE I. PARTICIPANTS IN ANDROID STACK DEVELOPMENT

Example Android Component	Contributors
WebKit	Apple, Collabora, Nokia, Google, Nuanti, Torch Mobile, RIM
SQLlite	Adobe, Oracle, Bloomberg, Mozilla
Open GL/ES	3D Labs, Accenture, Acrodea, Adobe, ALT, Altera, Antix, Aplix, Aptina, Axell, biodroid, broadcom, codeplay, core logic, creative, CSR, Dell, Digital Aria, DMP, draw

Example Android Component	Contributors
	elecoments, EA, Fixstars, Fujitsu, Google, graphic remedy, Hi Corp, HiSilicon, Huone, IBM, Keti, Los Alamos, Marvell, Mechnicality, Mediatek, Mentor Graphics, Mercury, Mitsubishi, Monotype Imaging, Motorola, Movidius, Mozilla, Mtekvision, NDS, NEC, Netallied, NetLogic, Nexus Chips, Open Eye, Opera Software, packetvideo, Palm, Panasonic, presagis, QNX, Renesas, Rightware, S3, sasken, SK Telecom, smithmicro, Soft Bank, Sony Ericsson, SRS, ST Micro, symbio, Takumi, Telechips, TES, ThinkSilicon, Toshiba, Transgaming, Vivante, Vixs, vmware, Yamaha, Yumetech Inc., Zebra Imaging, ZiiLabs

Source: [3], [4], [5]

TABLE II.   CODEC DELIVERABLES TO ANDROID

Codec	Responsible Forum
AAC LC/LTP	3GPP (.3gp) and MPEG-4 (.mp4, .m4a)
AMR-NB	3GPP (.3gp)
AMR-WB	3GPP (.3gp)
MP3	MPEG
MIDI	MMA
Ogg Vorbis	xiph
PCM/WAVE	WAVE (.wav)

Source: Google [2]

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