

Progression of Hardware Platform of Mobile Phone Processors

Dr. G. Shankar Lingam¹

Professor, Dept. of CSE, Chaitanya Institute of Technology & Science, Warangal, Telangana, India¹

ABSTRACT: In the past few years, forced by Google Inc. and apple Inc., the acceptance of smartphones has skyrocketed. By the conclusion of March 2012, the proportion of smartphones within relation to other mobile phones purchased in seventy % was exceeded by Japan. Though they're utilized in an excellent variety of embedded methods such as private digital organizers (Sensor networks, wearable computers, cellular phones, smart badges, laptops, internet appliances, smart cards, and PDAs) , the common demand for power that is low, security, code density is shared by them, price sensitivity as well as multimedia as well as correspondence processing. The objective of this paper is actually reviewing the area of processors for mobile programs. A spectrum of processors, their system program, and the accompanying hardware components are surveyed by us. The emphasis is on identification and classification of major technology and structure trends. This paper details the evolution of the application program processor used on the high performance hardware platform supporting significant smartphones.

KEYWORDS: Smartphones, communication, generation, power consumption

I. INTRODUCTION

The processor is the "brain" of each device. The Processor handles the instructions of the software applications. All cell phones have a processor of a few different which can be integrated into the principle mobile smartphone chip, or are a separate PC chip. A faster processor lets in applications to run quicker. The pace of uncooked processor is measured in MHz or GHz. However a few processors are more effective than other processors, so even supposing two distinctive processors both run at a pace of 1GHz, if one processor is more powerful, it could run software applications a good deal quicker. Other elements frequently affect the perceived pace of a mobile smartphone, For instance, the wireless radio and network determine how speedy the facts receives downloaded. Also, telephones may additionally have a separate pictures processor that determines the speed of visual elements, particularly with games and other regions with complex animations.

A mobile processor [1] is a device on a chip designed to support applications that are going for walks in a cellular smartphone's running device. A cell processor affords a self-contained working environment that presents all device capabilities required to guide a cell applications, together with memory management, graphics processing and multimedia. Mobile processors can be unbiased from other specialized processors inside the same tool, together with a phone's baseband processor. Some carriers manufacture their own mobile utility processors. Other companies buy their cell utility processors, the use of them as authentic gadget producer additives. For instance, the Qualcomm Snapdragon cell phone application processor is contained in lots of clever telephones that use Qualcomm Snapdragon to run the Android cell telephone operating gadget and Android cellular packages. A huge style of cell devices incorporate cellular processors, including characteristic cellular telephones, smart phones, tablets, eReaders, netbooks, car navigation gadgets and gaming consoles.

II. RELATED WORK

The configuration of the hardware platform presently used in Fujitsu's smartphones is proven schematically in Figure.1. The platform consists of a software processor, a modem (baseband), a twine- much less unit, anpower supply, an audio LSI, synchronous dynamic random access memory (SDRAM), and flash memory. As described within the following subsections, various technology that form the center of the rapidly evolving application processor had been evolving swiftly.

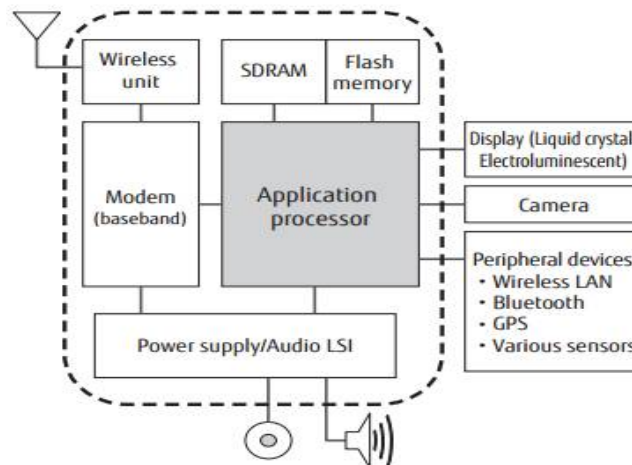


Figure.1 Configuration of hardware platform.

Snapdragon is a circle of relatives of cell device on a chip (SoC) processor design provided by means of Qualcomm. In U.S. Markets, Qualcomm leads the approach in android telephone implementations with the snapdragon SoC (System-on Chip) platform. Flower starts off evolved with an ARM-well suited principal processor center of Qualcomm's personal style. Currently, the valuable processor center in snapdragon processors is referred to as krait, and is loosely similar in velocity to ARM's Cortex A15 reference fashion. Paired with krait is Qualcomm's Adreno snap shots technology. This GPU line started existence at ATI under the brand name Imageon, and turned into picked up by way of AMD in 2006 as soon as it purchased ATI. Two years later, AMD bought-out off the Imageon technology to Qualcomm, that re-branded them Adreno. It's a nervy pass Qualcomm's part: Adreno is admittedly an anagram of Radeon, the brand call nonetheless utilized by using AMD for its snap shots cards. Qualcomm became initial out of the 4G LTE gate with an integrated SoC implementation for the Wi-Fi fashionable. This area Qualcomm at a large benefit in markets similar to the U.S., wherever LTE help became vital characteristic. Direct SoC integration moreover earned the snapdragon a right away numerous phones, because the unique is to function a separate LTE modem chip—hence elevating cost, strength usage and generating complexity for cellphone makers.

Currently, the snapdragon 800 series is Qualcomm's high giving, that consists of up to 4 krait cores jogging at as much as two.46 GHz, and partnered with Adreno 330 pix. Arguably, this represents the foremost complete processor package deal for android gadgets nowadays, offering superb performance altogether regions among an inexpensive energy price range. Snapdragon-based totally gadgets additionally get the lion's proportion of publish-release study-most effective memory improvement from fans.

Just next door is that the snapdragon 805, a platform refresh that may feature faster krait cores, AN stepped forward Adreno GPU, and quicker RAM statistics measure. Oddly, Qualcomm's initial 64-bit mobile elements can arrive these 12 months in the fashion of the low- to mid-variety snapdragon 410. High-end factors location unit predicted quickly later. An analysis and comparison of power consumption measurements in mobile phones for 2G and 3G networks is presented for the services-text messaging, voice and data [2]. The paper reports larger energy consumption in 3G networks for text messaging and voice services than energy consumption in 2G networks. In [3], authors analyse the end-to-end communication activities of a modern mobile phone, Nokia N95, to understand how much energy different communication alternatives consume. In particular, they investigated the interactions when multiple connections are used in parallel.

In [4] authors show that the energy can be saved and hence the capacity of the cellular networks can be increased by guiding users indirectly to optimize their UE (User Equipment) location. The results show that a path loss (PL) improvement of up to 10–25 dB can be achieved. The architectural design-space and methodologies for reducing the dynamic power dissipation in the Direct Sequence Code Division Multiple Access (DS-CDMA) downlink RAKE

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 1, Januray 2016

receiver is presented in [5]. At the algorithm level, authors investigate the tradeoffs of reduced precision and arithmetic complexity on the receiver performance.

An architecture for receive diversity which significantly reduces the power consumption in Long Term Evolution (LTE) compared to conventional approaches is proposed in [6]. Depending on the environment it has a similar performance as maximum ratio combining while delivering a power saving of 30% in the radio frontend. A power management scheme while downloading webpages in 3G network is proposed in [7]. Authors identified some special characteristics in WCDMA and address power consumption issues through two novel techniques. Adaptive power control algorithms has been widely studied for interference reduction, base station radiation decrease and terminal battery saving in 3G cellular systems. In [8] authors propose an evolution of these algorithms in the forward link.

III. MAJOR TECHNOLOGICAL TRENDS

The single most important and most influential semiconductor trend has been a three-decade long sequence of technological improvements. This progress enabled very-large scale of integration of a single chip, and the realization of remarkably powerful processors. It is interesting and instructive to take a closer look at key technological data and trends in embedded mobile processors. The first column shows the design feature. The next four columns shows minimal, average, maximal and representative values for the features in the workstation processors. This is followed by the same data for embedded and eventually mobile processors. Power sources are among the most crucial components when designing mobile embedded systems. Batteries are currently widely used as the power supply of choice for mobile embedded systems. Portability constrains the size and weight of the batteries. In addition, frequent battery replacements and frequent and long battery recharging are also undesirable.

Figure 2 shows a simplified view of the growth in the battery technology vs. the microprocessors technology. As can be seen from the chart, Moore's law is not applicable to batteries. However, as new applications emerge on embedded processors, the power requirements for mobile processors increase. Figure 3 illustrates the trends in total processor's power consumption as the area and the frequency of the die increases.

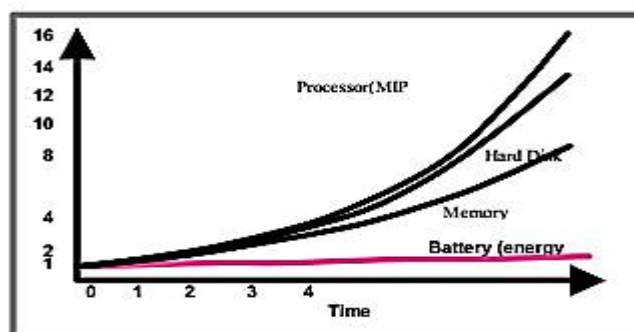


Figure.2 Improvement compared to year 0

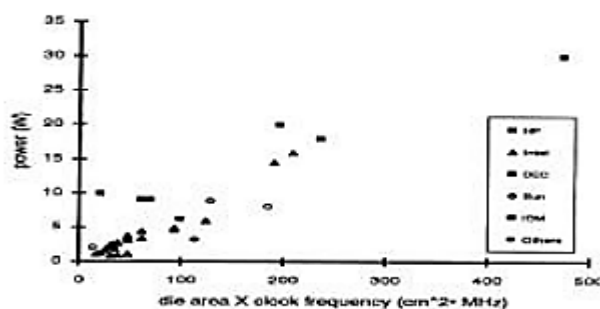


Figure.3 Power consumption vs. clock freq. x die area

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 1, Januray 2016

Case Study - DSP processors

DSP processors form just about the most essential classes of movable embedded processors. DSP hardware sales produced over 1 dollar 1 three billion of revenue previous year and they've one of the highest CAGRs (Compound Annual Growth Rate) within the semiconductor business. Particularly, DSP processors are actually a mandatory component in our mobile phones. It's really instructive constructive to evaluate the fashion in DSPs in the last 2 years. The DSP structure has been strongly influenced by both the evolution in technologies as well as the specific applications. One of significant architectural novelties on the DSP processor was the specific multiply-accumulate (MAC) product. In 1980, a general-purpose programmable DSP had over ten times MAC performance edge over the microprocessor. [Ack98]. In 1985, the MAC general performance benefit of DSPs over microprocessors shrank to five. By 1995, the MAC functionality of DSPs and microprocessors became similar. DSPs have seen a gradual performance improvement to ensure that today's microprocessors are actually outperforming DSPs found MAC dominated apps [Ack98]. On another hand, DSPs created a number of alternative benefits over microprocessors. They've drastically lower-power lower-cost signal processing engines which have MOP/mm² and MOP/mW ratings which are an order of magnitude much better than microprocessors.

The field and power effectiveness of DSP processors is actually optimized at many style levels: at the structure and algorithmic level by changes of arithmetic modules through enhanced memory business, by use of unique logic families, and also through making use of a lot more effective and power-sensitive CAD equipment [Ver00]. Developments in digital marketing communications and pervasive computing, is actually applying different and even more intense requirements for lower power, low price, and then programmable DSPs. Examples on the growing mobile embedded apps normally include cellular terminals, smartphones, real-time clip communications, 3D graphics as well as wireless base-stations. The DSPs in use these days are not promising candidates for the apps mentioned above. A brand new generation of DSP processors with assistance for complicated, multi-threaded, real-time synchronous apps is actually required. Parallel architectures are needed to satisfy the sought-after performance. The brand new applications will have a lot bigger mind and bandwidth specifications than previously. The limited time to promote frame suggests a demand for a compiler-driven programming atmosphere which supports parallel programming as well as debugging. Portability calls for an even further reduced power usage, which is quickly becoming the most crucial style issue. Hence, new power-saving methods have to be introduced. For example, dynamic voltage scaling is actually an attractive choice to sustain the overall performance at worst-case conditions while reducing the potential under normal conditions.

IV. CONCLUSION

Recently, mobile applications and mobile programmable processors have attracted a great deal of attention. The processing performance demanded of smart-phones will continue to increase, so the application software and hardware platform will become even more closely integrated. This means that efforts to achieve a balance between performance, functionality, and power saving will become more and more important. To support next-generation data-centric mobile devices, processor architecture has to be designed considering new approaches. Still, the development in mobile processors is driven by factors such as low-power consumption, user interface performance, time to market, etc.

REFERENCES

- [1] Farinaz Kaushanfar, Vandana Prabhu, Miodrag Potkonjak, Jan M. Rabaey: "Processors for Mobile Applications".
- [2] Gian Paolo Perrucci, Frank H.P. Fitzek, Giovanni Sasso, Wolfgang Kellerer and Jorg Widmer, "On the Impact of 2G and 3G Network Usage for Mobile Phone's Battery Life", Wireless Conference, pp. 255-259, European, 2009.
- [3] Jukka K. Nurminen, "Parallel connections and their effect on the battery consumption of a mobile phone", IEEE Consumer Communications and Networking Conference proceedings, pp. 1-5, 2010.
- [4] Joonas Säe and Jukka Lempiäinen, "User Guided Energy and Capacity Optimization in UMTS Mobile Networks", IEEE 25th International Symposium on Personal, Indoor and Mobile Radio Communications, pp. 882-886, 2014.
- [5] Vikram Chandrasekhar, Frank Livingston, Joseph Cavallaro, "Reducing dynamic power consumption in next generation DS-CDMA mobile communication receivers", IEEE Proceedings on the Application-Specific Systems, Architectures and Processors, pp. 260-270, 2003.
- [6] Johannes W. Kunze, Attila Bilgic and Josef Hausner, "Adaptive Low Power Receive Diversity for LTE", IEEE proceedings on Radio and Wireless Symposium (RWS), pp. 661-664, 2010.
- [7] Bo Zhao, Qiang Zheng and Guohong Cao, "Energy-Aware Web Browsing in 3G Based Smartphones", IEEE 33rd International Conference on Distributed Computing Systems, pp. 165-175, 2013.
- [8] Jad Nasreddine, Louffi Nuagmi and Xavier Lagrange, "Downlink Adaptive Power Control Algorithm for 3g Cellular CDMA Networks", 15th IEEE International Symposium on Personal, Indoor and Mobile Radio Communications, Vol. 3, pp. 2192-2196, 2004.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 1, January 2016

[9] <http://tech.firstpost.com/>

[10] <https://www.qualcomm.co.in/products/snapdragon>

[11] <http://www.greenbot.com/article/2095485/androidprocessors-the-past-present-and-future-of-smartphone-chipdesign.html>

BIOGRAPHY



Dr. G. Shankar Lingam completed his MCA in Chaitanya Degree & P.G College and M.Tech in CSE from Ramappa Engineering College respectively. He is having teaching experience of more than 20 years in various Under Graduate and Post Graduate courses. He has guided lots of students in various Under Graduate and Post Graduate Research Projects. At Present, he is working Professor, Dept. of CSE, Chaitanya Institute of Technology & Science, Warangal, Telangana, India.