



# The Ghost of IBM PC

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<http://www.ck-wong.ca/Technologies/ghost%20of%20ibm%20pc%2020060225.pdf>

## Introduction

Since PC came home in the 1980's, the little computing gadget has changed the world. PC is not just personal; it controls our life, banking, manufacturing, entertaining and the integrity of the community and the equilibrium of the world. The proliferation of PC is possible because of IBM made the decision to standardize the hardware interface in the Basic Input and Output System (BIOS). Now, the name of IBM and PC are drifting apart. There is a new force call Lenovo that will not just change our life's routine but also your bank account. This change could be dangerous and highly influential at the level of personal, technology, country and world economy.

## How did we get here?

In late '70, a number of professional and amateur computer brands sprang up like mushroom. All of them were trying to get ahead of the computing technology curves called microprocessors. Although there were Motorola, Zilog, TI, Sinclair and Intel, Motorola, Zilog and Intel microprocessors were pretty much about the same. This means software written for one processor might be run on other or with little modification. In the 1981, IBM coined the term Personal Computer by trademarked the term PC and produced the famous 5100 model using the famous Intel 8088 microprocessor. Motorola continued its journey lonely for over a decade until its joint venture with IBM to create the PowerPC. Apple picked up PowerPC for their Macintosh series computer. Now, the table has turned. All major personal computers are Intel based including Macintosh.

PC has been a home fixture for over a decade now. While technology continues its leap frog following the great Moore's Law, the battle field has moved from technology to business.

## Who are the benefactors of PC?

Since PC manufacturer does not pay royalty, it gave the Taiwan electronic industry a successful roadmap starting from low-tech to the high-tech through the OEMing and foundry businesses. In US, Dell becomes the world's largest computer manufacturer. IBM always sees PC as a business sales tool rather than a revenue winner. It has never succeeded to have a profit except the China market in the 1980's. China could not afford the mainframe. Like India, the computing experience was all trained by the PC. Many African countries are just developing their computing industry on the foundation of PC. [2]

Computing industry has to be developed from three areas: education, research and commercial application. Education provides the human resources to participate the

industry. Research fortifies the culture in the country. Commercialization allows the country participate the technology at the country level.

Large scale conduction of education, research and application are not cheap. Under the mainframe model, it costs at least at multi-million dollar scale. The appearance of mini in the 1970 to early 1990 alleviated the steep cost a little. It is still at million dollar level. In 1990's PC has lowered the cost to thousands. In the 2000's the cost enters the lean age of sub \$1000 level. Many developing countries such as Thailand can use the PC and wireless to do something significant. The tsunami recovery project in Thailand is organized by a number of volunteers using notebook and wireless network to accelerate the reconstruction of the villages and manage the logistics of the constructions. PC is not necessary but the PC network shortens the timeframe and communication at least by one order of magnitude.

Among these countries, they are consumer of the knowledge and the equipment. China and India are the countries forced to develop the PC hardware industry to lower the cost for their people. The imported PC is just too expensive. Obviously, the white-hot Chinese economy created a miracle that enabled Lenovo to take over the IBM PC. This is the first case that China won after objection brought up in the Congress. Congress' worry the PC high-tech could be military grade. Same reason of protectionism denied CNOOC's bid of Unocal. But IBM is no Unocal. If IBM wanted to sell, it sold.

### **Is Lenovo a threat?**

The PC technology remains in American's reign. The development of advanced technologies such as the DDR2 memory and the PCI-E are the products of the American's hard work. These new technologies makes PC gained the power to replace any mainframe. The core of many large servers is no significantly different from your desktop. There server just has more memory, storage and engineered to have higher tolerant to failures. The famous Super Computer Cray system is no more the only solution to very large scale computation. The SETI project has succeed to link millions of PC to perform humongous astronomical computation (really). From engineering perspective, the single point of failure mainframe model is far more inferior to the distributed rugged PC based systems.

The most cutting edge of computing is to use standard microprocessors found in our computer to build a network at order of ten thousands to do computation. Lenovo is not there .... yet.

Down the road it is just a fair game of research and development which American has started decades earlier. The key factor of success of this monster computer is engineering optimization which Chinese realized. One of the cost factors to make PC expensive was that each system had to be configured manually. Ten years ago, the motherboard could support many versions of the microprocessor and features. However, the configuration to make all these work together was by dip switches and jumpers: something a pair of hands had to press and twist here and there.

In 1996, two motherboard manufacturers, Quantum in Hong Kong and Abit in Taiwan, succeeded to develop motherboard configured by software. This new ability significantly cut down the time and labor cost of the manufacturing. Ten years later jumper and switch configured motherboards are completely sidestream products. They either appear in obsolete or highly rugged military grade products.

The importance of this achievement could easily be overlooked. When the density of the computing machine increases, the real-estate for the dip switch and jumper becomes extremely expensive. The 1U size, so called pizza box, server has only couple of inches thick and a computer cabinet can house up to 32 of these machines. When you need to change the configuration, without the software menu to change, it becomes impossible. If you are going to ask how often, yes, it is not often. However, once out of a blue moon, it would be mostly impossible to make the change to jumper and dip switches without disassemble the machine. This translates time, money and danger of physical damage.

The soft-manual has another big advantage for mass production product based on a uni-design but can be configured for different functions. The multiple personalities of the computer could easily configured through soft-manual is a cost advantage. Down the road, in the 10 thousand computer array, this is also more important. Allowing China to continue on the roadmap is a dangerous window.

On top of this, the Western electronic industry pushes the computer industry advancement use a roadmap to maintaining the neck breaking speed. [3] The roadmap is maintained by the industrial experts who identify the technology roadblocks and solutions to overcome the roadblocks. This means Lenovo will participate in the roadmap and share the future cutting edge technologies in electronics. This is why US Congress worries which is not unfound.

## **Business Threat**

The Lenovo is planning to sell sub \$500 PC which will push the lean and mean industry to more lean and mean. [4] This has a significant meaning. The sub \$500 PC is equivalent of the flooding of the Chinese made DVD player in Walmart. It creates two threats: the first is cannibalizing its IBM brand, the second is US PC giants such as Dell and HP. When one company willingly cannibalizing its product line, you can understand there must be a big agenda behind the strategy. The agenda is to eat Dell and HP's lunch in the PC market. When this happens the immediate impact to the American will be the trade deficit.

## **Forward Looking Statement**

Looking forward, it is not just the PC market will be impacted. Mac market could also be endangered. Mac has switched the horse from IBM's PowerPC to Intel. Now the cow comes home and all in the family. Making a Mac clone would not be too far from making a PC. Apple did license the hardware to BeOS in the past. To boost its profit, it may take the bold step to license all its gadget (iMac, iPod, and Mac) manufacture to Lenovo so that it can concentrate on its software and entertainment business. [5]

## The Ghost of the Past

IBM PC is a legend. It baptized the Internet revolution, the modern industrial revolution. It also represents the change of guard on economic engine. The leader in PC manufacturing leads the world economy. We are witnessing the change of tide. The Asian and African is chasing the technology and economic curve. American has suffered once by missing the VHS generation, once more for missing the DVD manufacturing and now it is PC. All these are not volunteered progression. Perhaps the world domination has been following the rotation of Africa 6000 years ago, to Asian 2000 years ago, to 1000 years ago in Europe to North America in last 100 years. Would it be Asian's turn again?

## Resources

[1] IBM PC [http://en.wikipedia.org/wiki/IBM\\_PC](http://en.wikipedia.org/wiki/IBM_PC)

[2] The African Hacker, IEEE Spectrum, August 2005.

<http://ieeexplore.ieee.org/iel5/6/32056/01491223.pdf?tp=&arnumber=1491223&isnumber=32056>

[3] The Innovative Curve, Computer Magazine, February 2006,

[http://www.computer.org/portal/site/computer/menuitem.5d61c1d591162e4b0ef1bd108bcd45f3/index.jsp?&pName=computer\\_level1\\_article&TheCat=1001&path=computer/homepage/0206&file=ourtime.xml&xsl=article.xsl&](http://www.computer.org/portal/site/computer/menuitem.5d61c1d591162e4b0ef1bd108bcd45f3/index.jsp?&pName=computer_level1_article&TheCat=1001&path=computer/homepage/0206&file=ourtime.xml&xsl=article.xsl&)

[4] Lanovo unveils its own brand in United States

[http://www.chinadaily.com.cn/english/doc/2006-02/25/content\\_523939.htm](http://www.chinadaily.com.cn/english/doc/2006-02/25/content_523939.htm)

[5] Google Becomes an Entertainment Company, February 2006 Computer Magazine, IEEE Computer Society.