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The Development Roadmap

What was the need for such a device?

The National Mission on Education through Information and Communication Technology (NME-ICT) aims to leverage the potential of ICT in providing high-quality, personalised and interactive knowledge modules over the internet in an any-time, any-where mode. To do so, a computing device that was low in cost but rich in features, was seen as an imperative.

Why is the MHRD involved in the development of a tablet for students?

Around 5 years ago the government was approached by an organisation with a proposal that the Government of India should purchase large quantities of a device at an offer price of US$ 100 per device. On further discussions this was found to be over US$ 150 per device. The device, while it was billed as a "laptop", was found to have limited functionality and was targeted at school children.

Since requirements in India were of very large numbers, the MHRD felt that the device should be ideally priced at under US$50/device with the ultimate goal of reaching $10 per device much later. They were told that this was impossible.

This was the genesis of the program that was set up by MHRD under the NME-ICT, with the objective of designing and productionising a functional computing device at an ex-factory cost that was around US$ 35/device.

A number of small teams, consisting of hardware and software designers, as well as persons with experience of commercial issues and negotiation, were nucleated under the Mission to achieve this goal.

What is the intent of this device?

The objective of the core team of experts was to create specifications for a made-for-purpose device, in this case, the purpose being education.

Since the Mission (NMEICT) is meant for higher education, this device has all the capabilities required by a student, including Wi-Fi, streaming video (to play NPTEL lectures), e-book reader etc.

Various open-source educational software packages like Sci-lab etc will also be ported on to this device. Using this device, students can also access all the content created under the other components of NMEICT like Virtual labs, N-LIST etc.

Features were added or removed keeping in mind that the 2 key objectives – enabling education and keeping the price low.

Why did the MHRD not give the task of development to the private sector?

MHRD requested big players in VLSI design to work with the Ministry so as to have a true System on Chip (SOC). In spite of a lot of talk about corporate social responsibility, there was lukewarm response to the idea from big names in the Indian Industry. MHRD had no choice but to go it alone.

What was the methodology adopted by the MHRD in designing the device?

The idea was first discussed with a group of Professors / experts from IISc-Bangalore, IIT-Kanpur, IIT-Kharagpur, IIT-Madras and IIT-Bombay.

The teams worked on various designs and came out with different prototype devices. The challenge, however, was to design a device that could be productionised at an ex-factory cost of around US$ 35.

Initially, the team's efforts were met with scepticism and scorn. However, as various prototypes appeared, not only did the confidence of the team members increase but, as word spread about this initiative, the team noticed that internationally and in India, tablet devices were being announced at sub-US$100 prices.

Thus, this initiative of the Mission has resulted not only in an ultra low cost device for the students in India, but has also created a new market niche. Today, there are devices appearing commercially in India and abroad at prices much lower than US$ 100

What is the role of IIT-Rajasthan in this program?

There was already a lot of chatter on various news sites and blogs about this device, much of it negative. To ensure complete transparency and a level playing-field, the Mission decided to task one of the IITs (IIT-Rajasthan at Jodhpur, in this case) with the job of

procuring and testing these devices, based on the design and specifications that the Mission's team had finalised.

How did IIT Rajasthan select the suppliers?

IIT Rajasthan followed an open tender process. A three-step process was followed to evaluate the bids that were thus received.

Step One: A committee scanned all bids to check their eligibility based on the conditions specified in the tender.

Step Two: Eligible bids were then evaluated by a technical evaluation committee comprising eminent academics and industry experts.

Step Three: Bids that were found technically suitable were then evaluated by a financial evaluation committee which then declared the lowest bidder.

Following set government norms, a further negotiation was then held with the lowest bidder and a further discount obtained from them.

The Pricing

What is the final price of the device?

On 22nd July, 2010, Kapil Sibal, the Minister for HRD, had unveiled a device that was expected to cost "around US$ 35". The lowest bidder from the subsequent bidding process quoted an ex-factory price of US$ 37.98 which was close to the cost mentioned by HRM. This cost that comprised of cost of components and material as well as manufacturing expenses.

The final landed price of $49.98/unit (which translated to INR 2276 at the exchange rate at the time of the order) includes taxes, levies, and charges like freight and insurance, servicing and documentation etc. The landed price also includes one-year **free replacement warranty** from the manufacturer.

What is the subsidy provided by the MHRD, if any?

This price **does not include any subsidy** from the Government and is a price that has been arrived at following a commercial tender process.

This is a unique device and is the first of its kind in the world. There is no other device that offers so much functionality at such a low cost.

The device has been named **Aakash**.

What is the minimum order you have to place with the manufacturer to maintain the $35 price tag?

The current ex-factory price of $37.98 has been obtained on an order quantity of 100,000.

Will Aakash also be commercially available? If so, at what price?

Aakash will be commercially available, at a somewhat higher price, but still below Rs. 3000/- per device.

The Manufacturing

Where was the manufacturing of Aakash done?

The manufacturing of Aakash has been done in India. There has been some speculation that this was made in China. A video that shows these devices being built in a plant at Hyderabad was shown at the launch event and will soon be available on Youtube

The Aakash tablet comprises many hundreds of components sourced from around the world. The major countries of component supply are as follows:

South Korea	-	39%
China	-	24%
United States	-	16%
India	-	16%
Taiwan	-	5%

Who is the manufacturer of Aakash?

M/s Datawind is the manufacturer of this current Aakash tablet. They have been given a pilot order for 100,000 pieces which have been procured for the purpose of testing by students all over India in different climatic and usage conditions

Why is the device a year late?

- The earlier tender had to be scrapped due to commercial reasons. The lowest bidder withdrew their bid at the last minute under various pressures. A new tender therefore had to be floated
- Several improvements were incorporated in the device to make it competitive in terms of features. This also took time.
- Also, it was decided that only those devices that were manufactured in India would be accepted

Are there any hardware changes to the device announced in July 2010?

Yes. A number of changes are there from the prototype shown one year ago.

- Instead of one full USB and one mini USB port, the device has two full USB ports.
- To boost video performance and to keep the main processor dedicated to device usage, a HD Video co-processor has been added in the device.
- A graphic accelerator also has been added.
- The resistive touch screen has been substantially improved.
- The performance of the wi-fi module has also been substantially improved.
- Further, the weight of the device has been reduced by about 80 gms and the outer casing has been completely changed.
- The device has now been completely productionised.

See Technical Specifications for details.

Can the battery provided sustain an entire school day of 8 hours?

The 2100 mAH battery in this pilot device has been tested to last up to 3 hours in a mixed mode operation. Efforts are on to increase battery life through design changes. Solar chargers specifically for Aakash will also be developed.

Today, the usage may not cover a full school day. As more applications become available, the usage will increase and the battery design will keep up with the demand.

Network Access, Content and Applications

How is Aakash different from other educational computing devices?

The Aakash Low Cost Access cum Computing Device is meant for students across India. Using this device, and the connectivity that is provided under this Mission, learners will be able to access all the thousands of items of content available on the Sakshat portal and every other educational web-site.

The real paradigm shift Aakash brings to education is enabling its delivery in any environment, any time and any where, with reduced dependence on an uninterrupted power supply.

The student is not bound to a brick and mortar classroom, but can access world-class lectures and educational content on this device even in the most remote corners of this country.

Learners, therefore, are no longer hampered by the lack of infrastructure or facilities but have the entire power of ICT available to them for educational purposes

How will students get access to Aakash?

The device will be distributed to students through the institutions at which they are studying.

All content has to be accessed from the net. How will students connect to the net?

It is expected that 416 Universities and 20,000 colleges all over India will be connected under the NMEICT. About **60% of the total Mission funding** has been reserved for this.

Each University will get 1Gbps connectivity (via NKN). Each University will also get a LAN of about 400 nodes. Each College will get connectivity of 20 x 512 kbps which they can club together to make 10Mbps

The Mission pays for fibre connectivity for each University to connect to the nearest NKN node. The Mission has placed a consolidated order for connecting all Universities and Colleges to BSNL and about 80% of the Universities and Colleges have been connected already

What about the content itself?

Apart from what is already available (and there is quite a lot of it), the NMEICT will support the creation of content. It has proposed 18 different line items for content creation. All content that is created under the Mission needs to meet the following criteria:

- It should be related to education delivery.
- It should involve faculty from different institutions
- All content should be created using open-source software.
- All content created under this Mission is for open access by all and cannot be charged for in any way
- All IP (Intellectual Property) funded by this Mission will vest with MHRD

What are the educational apps / tie-ups you are looking at? Will these apps be free or paid?

Educational apps, which will be free, will be uploaded on the LCAD discussion form on Sakshat website www.shakshat.ac.in. A number of apps stores have shown interest in providing free apps on the portal.

Are there plans for porting other operating systems on Aakash?

Some software companies are interested in offering their Operating System for this device.

How many partners do you have on board for development of open-source educational apps?

Under NMEICT, a number of projects have been sanctioned to create content and applications for educational purpose, such as animation, simulation, content and other applications.

Why is Android Market not available on this device?

Android Market needs the device to be registered with Google. Discussions are on with Google for this purpose. Apart from this, educational apps, which will be free, will be uploaded on the LCAD discussion form on Sakshat website www.shakshat.ac.in. A number of other apps stores have shown interest in providing free apps on the portal.

With broadband penetration being so low, how can a student access a feature like video-conferencing from home?

As far as broadband availability is concerned, MHRD has already placed orders and released funding for providing each university and college in India with a broadband connection. The video conferencing facility would soon be enabled on the device through web based camera. Students who have broadband at home could access using that, or else they can, of course, access it from their colleges. Under NMEICT, a project is on to provide standalone network-based solutions for very low cost connectivity to students' homes. That is in the initial stages.

Will there be any subsidy on the Internet connection for the institute or student's home?

If the standalone network based connectivity to student's home succeeds, the cost of a lifetime 256 kbps connection **could be as low as Rs. 1400/-.** The question of subsidy on the internet connection per student home would then not be significant.

So far as the internet connections for the institutions are concerned, under NMEICT there is already a subsidy of 75% from the Central Government.

Will financially weak students be provided some aid to purchase this device?

The idea is to make available this device to colleges and universities at a 50% subsidy and then to ask the colleges and universities to issue these devices to financially weak students from the library on the pattern of the Book Bank scheme. Thus, the financial aid for owning these devices will not be needed.

The Competition

Is this device too late with the launch of a $99 tablet in India?

The Aakash device is currently available at an all inclusive price of about US$ 50, which in itself is about half the cost of a US$ 99 tablet. This makes a huge difference in affordability of this device to poor students.

Going forward, with increased volumes, the price will only go down further. Also, at the same price, additional functionality will be available. Clearly today, the $99 tablet cannot compete at such levels.

Today, with the launch of tablets touching the Rs. 6000/- price point, how will you justify its existence?

This device has created a niche where many more competitors would join the price and specification war resulting in lower price and higher specifications. The ultimate winner will be the Indian student and anyone who has so far not been able to afford such devices. The nation's objective would be met through catalytic actions taken under NMEICT. This device could then become a leading light in that direction.

The NMEICT, therefore, welcomes such developments.

Other than the price, what will be the USP of this device?

Apart from the price, the functionality of the device and availability of suitable educational content targeted for the device through Sakshat Portal would be the USP of this device.

What next for Aakash?

What are the next steps as envisaged by the Aakash team?

This current phase was a pilot to procure 100,000 devices. This pilot helped in sorting out the production related issues.

These devices are now being distributed to students all over the country so that they can be extensively tested in various climatic and usage conditions. The feedback obtained from the testing will form an input into the design of the next version of the device. This is important, as the numbers that the Mission needs to procure are very large. To achieve this, a broad-based team of experts will be working on this task.

The production capacities of Indian manufacturers would also have to be substantially expanded to meet production requirements of a few million devices within a six-month time frame.

In how many cities / towns will Aakash be initially available?

Both the field trials and the availability of Aakash will be pan India.

What is the roadmap for the Aakash?

The Mission now wants to build the next version of the device around a System on Chip that this group of experts will design. By reducing the number of discrete components on to one chip, efficiency is expected to go up and price to further reduce.

Broadly speaking, future efforts will move in two directions – **to achieve the same functionality at a lower cost and to achieve added functionality at the same cost**.

How can other educationists and technologists help?

MHRD invites collaboration, ideas and inventions from the community of academics and experts and inventors to achieve these cherished goals.

MHRD also encourages display manufacturers, semiconductor fabs, component manufacturers and system integrators to establish their facilities in India so that in the long

run a suitable eco-system gets developed in the country to attempt even more ambitious goals.