

Founding a Fab-city

In the spurt of investments in IT in India in recent months, none has been as ambitious as the proposal to set up a semiconductor fabrication foundry. It is slated to be built with technology from AMD, the world's number two in the chips business.

Yogi Aggarwal looks at the proposal and how it fits in with the growth of the market

The India story in recent years has been intimately linked with information technology. In software the story has become the stuff of legend, and India has become a major outsourcing hub. In hardware, the story is different but encouraging. And in telecom the Indian mobile market is one of the fastest growing in the world at over four million mobiles bought every month.

While foreign majors have been around for some time, in the last few months there has been a quantum jump in their involvement with India. Whether in software, hardware or now in semiconductor fabrication, the big boys are either setting up shop or expanding existing operations.

In December, Intel announced a \$800 million investment over the next five years in its R&D centre in Bangalore and on marketing and education. In addition, it created a \$250 million Intel Capital India Technology Fund that will focus on hardware, software and service companies for technology development. It established its India Development Centre in 1999, employs 2,800 people and has invested \$700 million, making it Intel's largest non-manufacturing site outside the United States.

Cisco Systems, which started its Indian

operations in 1995, is also investing heavily in India. Cisco's president and CEO John Chambers was in India recently and announced a \$1.15 billion investment in the country. Of this, \$750 million will be for R&D, \$150 million for leasing and financial solutions, \$100 million for venture

capital, and \$100 million for customer support operations. Cisco's R&D activities are centred at its global development centre (GDC) in Bangalore, the largest GDC outside the US. Of its present strength of 1,400 people, 1,300 are in R&D.

But the biggest plans revolve around



THE TRANSITION FROM SERVICE PROVIDER TO CHIP MAKER: Inside a fab 'clean room'

semiconductors. For all its offerings of chip design, systems integration and testing, India does not yet have semiconductor fabrication foundries to make the chips that lie at the heart of the IT revolution. Now attempts are being made to remedy that gap.

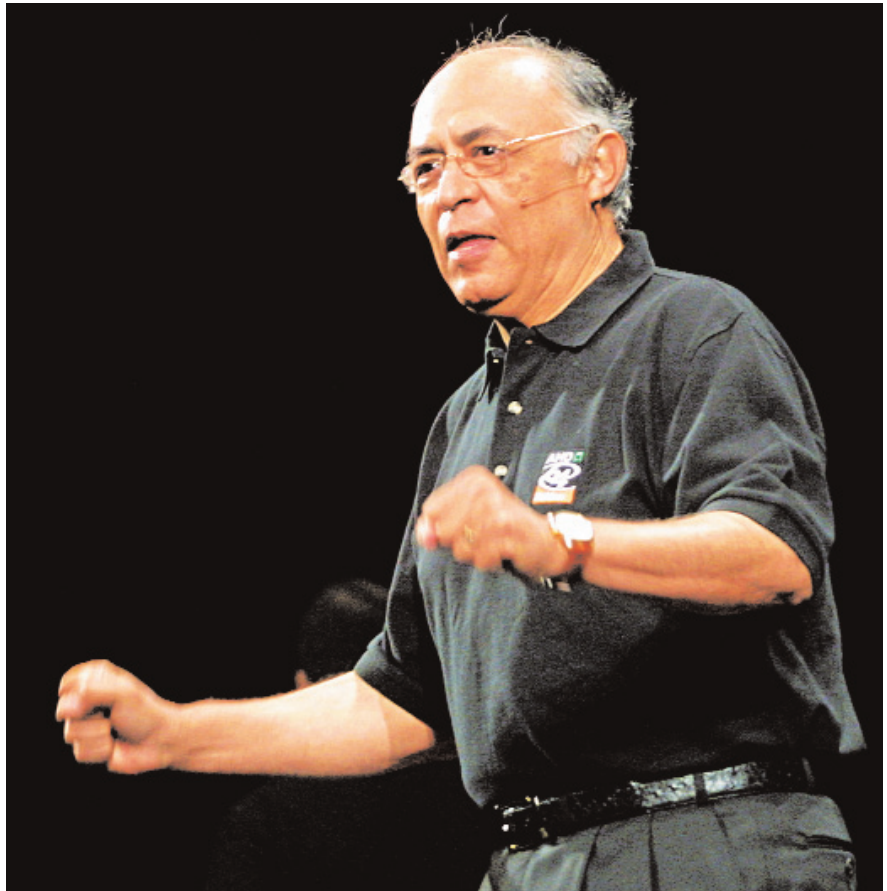
At least two efforts are on to set up fabrication foundries, or 'fabs' as they are known in the business. A consortium of overseas Indians has formed SemIndia, which announced this February its plans to set up a plant near Hyderabad in Andhra Pradesh with micro-processor and logic technology from America's Advanced Micro Devices (AMD).

Dr. Hector Ruiz, chairman of the board, president and chief executive officer of AMD, said when the MoU was signed, "AMD is committed to succeeding in global high-growth markets, and we are proud that AMD's industry-leading microprocessors and manufacturing capabilities will enable SemIndia to develop its own innovative solutions and expand the global market for information technology."

The CEO of SemIndia, Vinod K Agarwal, said, "Our vision is to make India a global hub for semiconductor manufacturing, and this agreement should bring world-class wafer fabrication to India for the first time." The first phase of the \$3 billion project is to begin soon with an investment of \$1 billion. SemIndia plans to secure some investment from the Indian government, plus other undisclosed investors.

A year earlier a Korea-based semiconductor company, Intellect Inc, promoted by June Win, former vice-chairman of Daewoo Corporation, announced it was setting up a plant in Hyderabad with an estimated investment of around \$1.6 billion in two phases. To be set up as India Semiconductor Manufacturing Company (ISMC), the Korean company has proposed to invest \$600 million in phase I and another \$1 billion in phase II.

India already has a strong network of companies doing semiconductor design, including systems integration, Very large scale integration design (VLSI), hardware and board design and embedded software. Almost every major international firm from Texas Instruments to Intel to Ericsson to IBM has its R&D or design lab for micro-



NEED FOR LEADING EDGE TECHNOLOGY: AMD president Hector Ruiz makes a point

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processors and applications. As the demand for design services grows, scores of multinational companies are making strategic investments in these areas.

"The Indian semiconductor company is in a transition phase from being just a serv-

ice provider to developing of intellectual properties. Captive companies are already carrying out work right from specifications to final tape out," says S R Dinesh, semiconductor analyst at consultancy firm Frost & Sullivan.

For instance, a study done by Frost & Sullivan for the Indian Semiconductor Association estimates that in 2005 the VLSI design was a \$583 million business in India, while hardware and board design generated revenues of \$140 million and embedded software for ICs was a massive \$2.55 billion. Together they employed 75,000 people.

The Frost & Sullivan study *The India Semiconductor and Embedded Design Market 2005-2015* shows a robust growth for the coming decade. It projects revenues from VLSI design to grow to \$2.01 billion by 2010 and further to \$5.09 billion by 2015, registering a CAGR of 24.2 per cent. The people employed in VLSI design firms will go up from 11,300 in 2005 to 33,000 in 2010 and 77,000 in 2015.

TECH AND TELECOM MAJORS FLOCK TO INDIA



MICROSOFT'S BIGGEST INVESTMENT IS IN INDIA: Bill Gates is keen on staying ahead

ALMOST every other day business dailies in India have a report of yet another IT company setting up shop in India or expanding their operations here. In 2005 alone there were more than 100 companies that announced startups or expansions. Most were in software, companies setting up back-end operations in the country. Others were in manufacturing, telecom or other hardware. In 2004, as many as 327 patents were granted to MNC development centres in India. Some of the companies that have been in the news:

MICROSOFT

In December, Microsoft's Bill Gates announced the biggest investment ever of \$1.7 billion in India while on a visit to the country. The investment will take the software giant's employee strength from 2,700 to 7,000 in four years, many of whom will be added to the 650 people at the Microsoft Indian Development Centre in Hyderabad which filed 40 patents last year.

The rest of the investment will beef up Microsoft's other R&D, product applica-

tion, and technical support operations. Microsoft Global Development Centre in Bangalore, for instance, develops enterprise applications that support the company's worldwide operations. The Bangalore based Microsoft Research India is doing research in multilingual systems, vital for a market like India. It has already announced a nine-language Windows XP edition for first-time PC users.

IBM

Big Blue left socialist India in the '70s and returned two decades later as the country began to liberalise. It initially started in a joint venture with the Tata group but after the Tatas disinvested in 1999, IBM had a fully owned subsidiary offering hardware, software, services and consulting.

It has expanded its India operations fast, from a headcount of 6,000 in December 2002 to 23,000 two years later to an employee base of 38,000 now, next only to the US. It has 16 centres in the country including the Innovation Centre for Business Partners,

the Linux Solution Centre and the India Research Laboratory.

TEXAS INSTRUMENTS

Texas Instruments was one of the first tech MNCs to come to India in 1985. It works mainly in very large scale integration (VLSI) design and embedded software. It has designed at least four chips in India. Last October it introduced a single-chip solution for low-cost mobile handsets in emerging markets. The parent company rules out a foray into manufacturing in India since it is setting up its second fab in Dallas.

HONEYWELL

The company has been India since the '80s and does over \$300 million worth of business. It has 6,500 employees and has a presence in four of its global businesses — speciality materials, aerospace, transportation systems and control solutions.

Honeywell is thinking of setting up assembly lines for a few of its security products at its existing locations within the country.

ORACLE

Oracle set up its first office in 1987 and the India Development Centre in Bangalore in 1994 and the second in Hyderabad four years later. Today it employs 8,500 people, mainly in sales and marketing. But India is the largest R&D investment outside the US.

India is its fourth largest market worldwide and its customers range across banking, telecom, manufacturing and government.

SUN MICROSYSTEMS

Sun has been in India since 1987, and the Indian operation as been a wholly owned subsidiary since 1998. It has invested \$120 million in setting up a Logistics Centre.

It also has an India Engineering Centre (IEC), the largest R&D outfit outside the US for Sun. It has over 1,200 engineers and expects a significant growth in its workforce over the next two years. The Sun IEC has received over 170 patents in four years.

HP

Established in 1988, HP in India currently has 15,000 employees spread out over 15 cities. It has groups for systems solutions, printing and hardware solutions, and a unit for personal computing systems. India is one of the few countries that has R&D teams in all the verticals. It also expects high growth in the Indian market.

TELECOM is the other area where big ticket investments are taking place. Apart from the equity investment by Vodafone, which took a 10 per cent stake in Bharti Televentures for \$1.5 billion recently, several other players are getting into manufacturing handsets and networking equipment among them:

NOKIA

Nokia announced a \$200 million handset manufacturing centre in Chennai, and has already brought in \$150 million and production is scheduled to commence soon. Ten suppliers have been selected and when the plant is in full operation in another three years it will employ 2,500 people directly with another 10,000 being employed by the suppliers.

ERICSSON

In March 2005, Ericsson announced a \$250 million manufacturing and R&D facility in Jaipur and Chennai. It is already manufacturing radio base stations and is going to produce mobile switching centres.

SIEMENS

In August, Siemens announced a \$100 million equipment manufacturing facility.

THE REST

In September, telecom giant Flextronics signed an MoU with India to set up a \$100 million hardware manufacturing facility in Chennai. LG has already started its handset manufacturing in Pune while Korean giant Samsung announced its \$15 million handset manufacturing facility in Haryana in December.



TIME TO GO FOR FAB: Rajendra Khare of ISA welcomes rock-solid government support

Similarly in hardware and board design, revenues will go up to \$571 million in 2010 and \$1.64 billion in 2015, registering a CAGR of 24.4 per cent. The people employed in this activity will go up from 3,300 in 2005 to 12,000 in 2010 and 35,000 in 2015.

The revenue and employment potential of embedded software are even more impressive. Revenues would have a CAGR of 30.5 per cent to grow to \$11.8 billion in 2010 and \$36.3 billion in 2015. The engineers, technicians and programmers would go up from 60,000 in 2005 to 241,000 in 2010 and 670,000 in 2015.

With India having such healthy growth figures in the 'fabless' areas of VLSI and hardware design and embedded software, there are some who would argue that there is no need for India to go for a risky and high investment field like a fabrication foundry. Currently, most of such foundries are in China, Taiwan, Korea, Malaysia or Singapore while the high value-added design work is done by the design teams of Intel, AMD or Texas Instruments in their labs in the US or in their labs around the world including India.

Critics argue that it is not necessary to have design houses in the same location as fab foundries, and that the return on investment of fab facilities is low and risks high, needing government subsidies and support. As one industry insider explained

it to CNETnews.com, "Microprocessors are one of the most difficult things to manufacture. It is easy to fall out of bed."

However, Rajendra Khare, chairman of Indian Semiconductors Association (ISA), says that a major source of strength for the proposed fab foundries is "rock solid government support". This can come in the form of equity participation, or a subsidy or low interest loans, besides ensuring that bureaucratic hassles are minimised. This is a normal practice when fabs are being started. For instance, AMD admits that government subsidies and loans to their fab plant at Dresden in Germany, amounted to \$1.5 billion.

"Our vision is of a fab city is to have fab foundry as the core industry, with auxiliary industry and township, university, research labs, design shops etc," says Khare. A state-of-the-art fab foundry costs a packet at around \$3 billion, while other facilities like the assembly-test-mark-pack (ATMP) operations can cost around \$100 million. Besides these there are the design firms and auxiliary units of supplies like chemicals, gas, raw materials and photo processing.

Vinnie Mehta, chairman of Manufacturers' Association of Information Technology is clear about the need for a fab: "The fab is going to complete a gaping hole in our capabilities," he says, "We've had software, design firms for semiconductors, PC and electronic component



SHAKING ON A GREAT DEAL: Ruiz with Vinod Agarwal of SemIndia while IT minister Dayanidhi Maran looks on

manufacturing capabilities — what was lacking was a fab. This is the right time to go in for such a strategic investment."

Agrees Ajay Marathe, CEO of AMD India, "The fab city will bring world-class semiconductor manufacturing capabilities to India and position the country as a future manufacturing destination. In addition to this, each fab will generate both direct and ancillary jobs, taking India's high-tech talent pool to a new level."

Figures brought out in another Frost & Sullivan study show just how big is the design and fab market going to be and the total employment potential. By 2015, says the study *India Semiconductor Market 2005-15: Growth, Trends and Forecasts*, the semiconductor and embedded design market will have a direct output of \$43.1 billion and an indirect output of \$33.6 billion, employing 782,000 people directly and another 2.96 million indirectly. The semiconductor manufacturing units will have a direct output of \$4.5 billion and indirect output of \$1.8 billion and will give employment to 23,100 people directly and another 34,600 indirectly.

Clearly while a fab may be important to

What is really driving the market is the exponential growth in electronics, which is expected to touch \$155 billion in 2015.

complete the IT capabilities, it's the design function that is the major revenue earner and employment generator. Poornima Shenoy, president of ISA says that there are around 130 design firms employing some 13,000 people, many of them foreign majors, in the country, doing embedded software, VLSI design, or hardware design. "End-to-end design is now done in India," says Ms Shenoy. In the last two years every major company in the world

has set up shop in India, mainly around Bangalore, she says.

The quality of design work is also high. "Captive MNCs in India are already carrying out bleeding-edge technology work," explains Dinesh, "Companies are designing ICs with 0.13, 0.09, 0.065 micron technology and hence India is already competitive in the global VLSI design industry."

What is really driving the market however, is the exponential growth in the electronics market. As an increasing number of Indians buy PCs or laptops, mobile phones, TVs and set top boxes, music and entertainment systems, and as the chip becomes an even more important part of our lives, the demand for the semiconductor rises.

But it is the demand for electronics that is the real driver. Electronic consumption, says Frost & Sullivan, is going to shoot up from \$11 billion or 1.6 per cent of GDP in 2005 to \$155 billion or 9.4 per cent of GDP in 2015.

That is the real revolution in manufacturing. The fab plants are a part of it. The transition is going to be rapid. The challenge is to make it seamless. 