

Knowledge and Sustainable Development

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Theme

- **Education and Sustainable Development**
 - **Research and Sustainable Development**
 - **Innovation and Sustainable Development**
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Requirements for Sustainable Development

- **Human capital with knowledge and skills**
- **Technology
(Innovation/Entrepreneurship)**
- **Correct government vision, strategy, action plan, policies**

Impact of just one institution---- MIT

- MIT graduates and faculty have founded 4000 companies
- Employ: 1.1 million people
- Annual Sales: \$232 billion
- Collectively these companies are the 24th largest economy in the World!

Overarching Approach

- Simultaneous **Bi-Modal Approach** Required

- **Bottom-Up**

- Basic Health, Primary Education, Water

- **Top-Down**

- Higher Education
 - Emphasis on Science & Technology
 - Industrial Linkages
- 

Education & Sustainable Development

- Attracting the Brightest
- Training the Brightest
- Using Technology to Leap Frog
- Curriculum (Problem Solving Approach)
- Enhancing Access
- Distance Learning

HEC Plan of Action

ACCESS / QUALITY / RELEVANCE

- **Faculty Development**
- **Infrastructure** (Free Access to Literature
Free Access to Sophisticated Instruments,
Technology Assisted Learning)
- **Focused Support in Key Areas**
- **Linkages to the Economy**
- **Quality Assurance**

STRATEGY

1) BASIC SCIENCES

Physics, Chemistry, Mathematics, Biology)

2) APPLIED SCIENCES

(Engineering, Agricultural sciences, Biotechnology, Information Technology, Pharmaceuticals, New Materials, Communications, Renewable Energy)

3) SOCIAL SCIENCES

4) ECONOMICS, FINANCE, MANAGEMENT

5) LINKAGES WITH INDUSTRY

Attracting the Brightest!

- **Change in Salary Structures**---under “Tenure Track” system salaries of Professors ***raised to 3 times of Federal Ministers in government!***
- **Research Productivity Allowance**---based on Cumulative Impact Factors during the preceding year
- **Reversing the Brain Drain**---under “Foreign Faculty Hiring Program” over 500 eminent expatriate/other scientists attracted to return to Pakistan

Attracting the Brightest!

- Research Funding (upto US\$ 600,000 per international linkage program)
- Guaranteed Jobs to fresh Ph.D.s with higher salary structures under tenure track system
- 75% Reduction of Income Tax for all academics

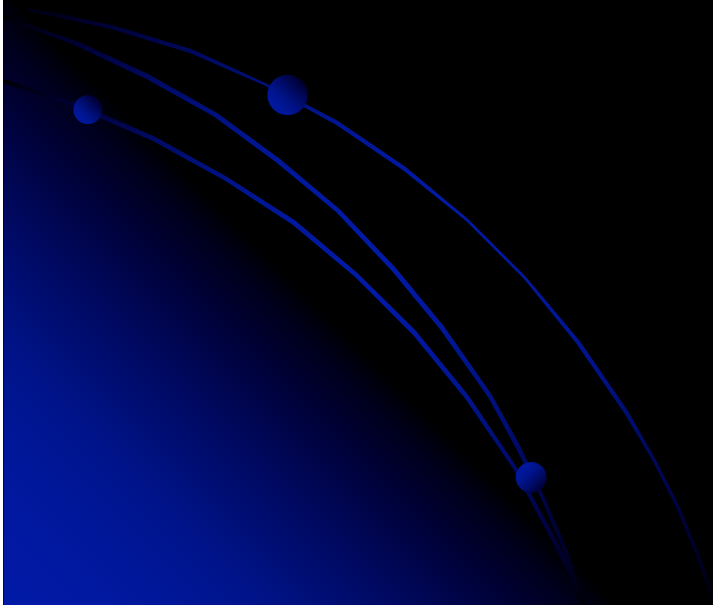
Training the Brightest!

- **Massive Foreign scholarship programs** initiated---500-1000 students being sent abroad annually to top universities in Europe, USA, China **with guaranteed high salary jobs and research grants of US \$ 100,000**
- **Indigenous Ph.D. programs**---expansion of the existing Ph.D. output to 1500 per year
- **Huge Local Scholarship Programs for Undergraduate level** studies initiated---Rs.1 Billion to be spent!

Training the Brightest!

- Local Ph.D.s being offered opportunities for postdoctoral training (hundreds being sent)
- Linkages with top Western Institutions---50 with British Universities alone, many others
- US\$ 150 million Fulbright program for MS/Ph.D. level training in top universities with USA---largest in world!

Establishment of New Engineering, Science & Technology Universities (UESTP)



Partner Countries

- France
 - Sweden
 - Germany x 2
 - Austria
 - Italy
 - China
 - South Korea
 - Japan
- 

Demographic Changes in Europe—A Major Opportunity !

- Diminishing younger populations of scientists & engineers in Europe
- Companies looking for countries with high engineering skill base/lower manpower costs to outsource future high tech industries
- A major opportunity for Europe, if they can have highly qualified science & engineering manpower trained to top standards

UESTP Concept

- Consortium of leading Universities with one as lead university---4,500 of our brightest students being sent for MS/PhD
- Rectors, Deans, Heads of Departments and 75%-25% faculty from partner country
- Examination /Quality assurance controlled by European universities
- Complete equivalence
- Degrees from top European Universities in Pakistan !!!
- Classes commence in 2007/2008 !!

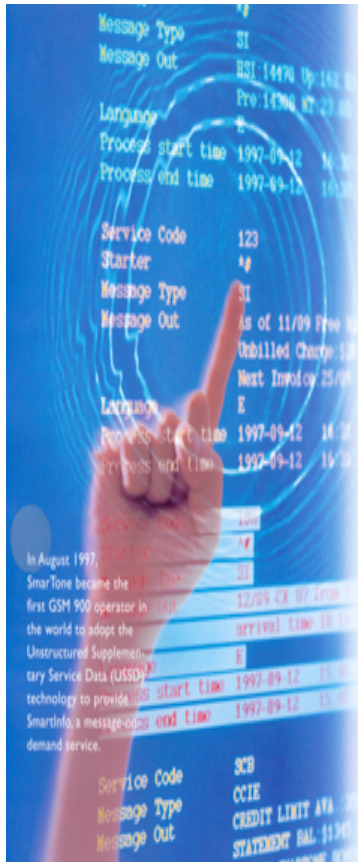
Benefits to Foreign Partners

- Availability of pool of well trained labour for expansion of partner country's industry in Pakistan and make it globally competitive
- Access to Pakistan's large and expanding market .
- Highly-qualified labour attracted from Pakistan will overcome demographic factors and shortage of labour force.

Using Technology to Leap-Frog!

- Pakistan Educational Research Network
 - Digital Library Program
 - PAKSAT 1 (Pakistan's Educational Satellite)
 - Pakistan's International Video-conferencing Network
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- A decorative graphic in the bottom-left corner of the slide. It features three blue curved lines representing satellite orbits, each with a small blue dot at its end, suggesting the path of a satellite in space.

The IT Strategy...



High capacity, reliable and accessible communications



Service to the Citizens

Laws and enabling environment

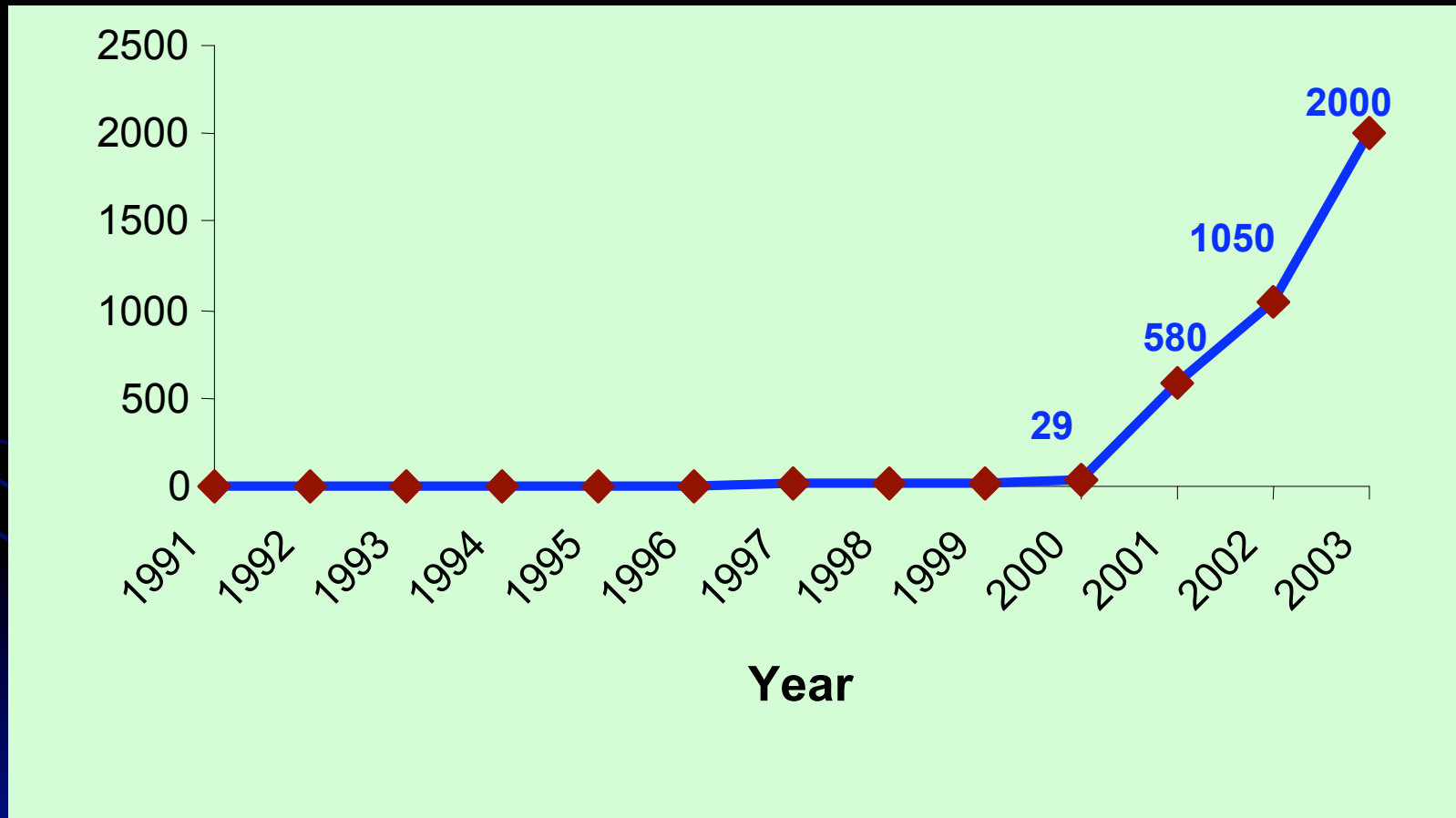
IT Education

And an environment that stimulates creativity and welcomes advances in the use of Information Technology



Information Technology

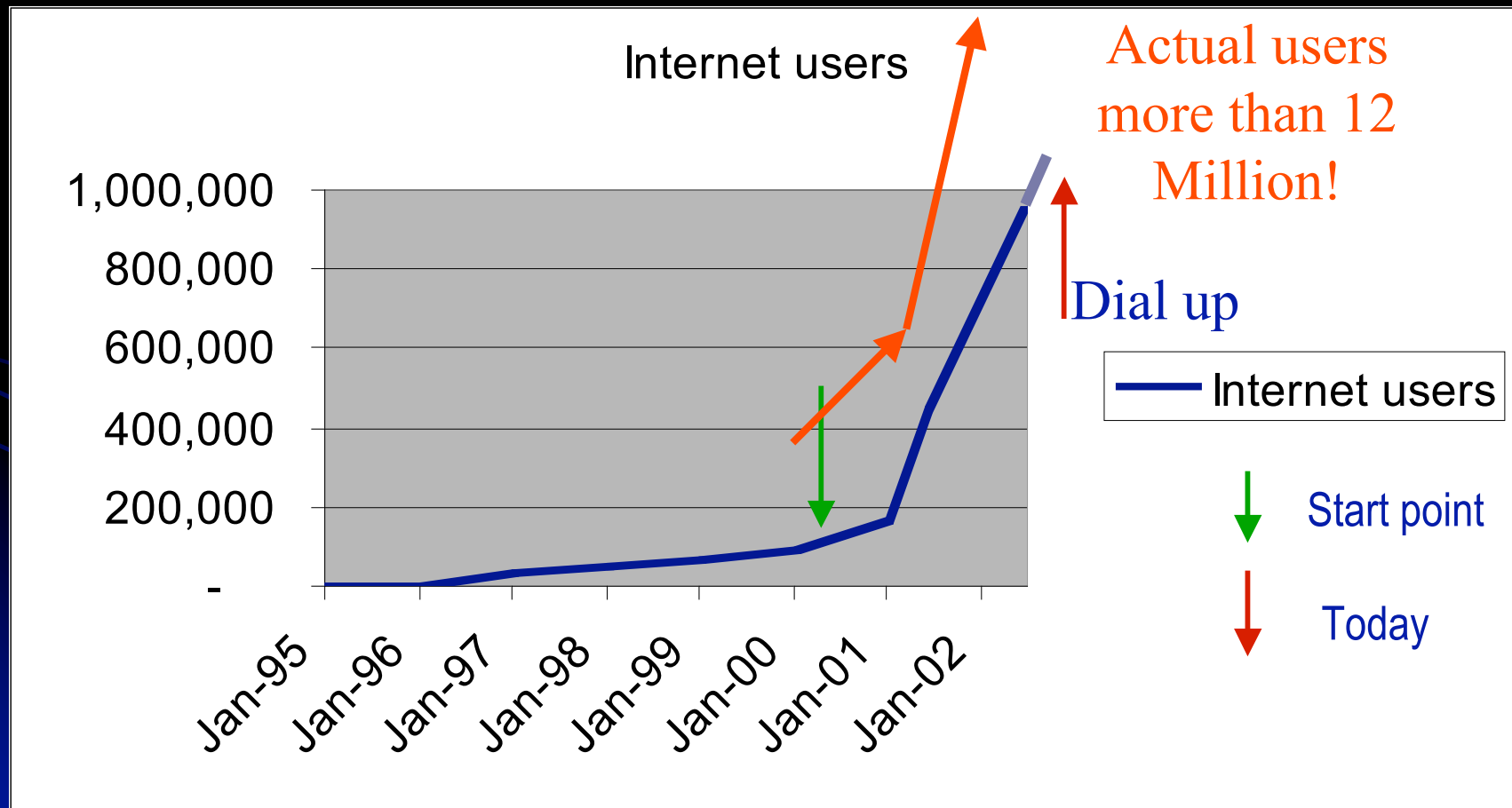
Spread of Internet Services in Cities & Towns of Pakistan



Internet user growth

JUNE 2000: 130,000

OCT 2006: >12 MILLION



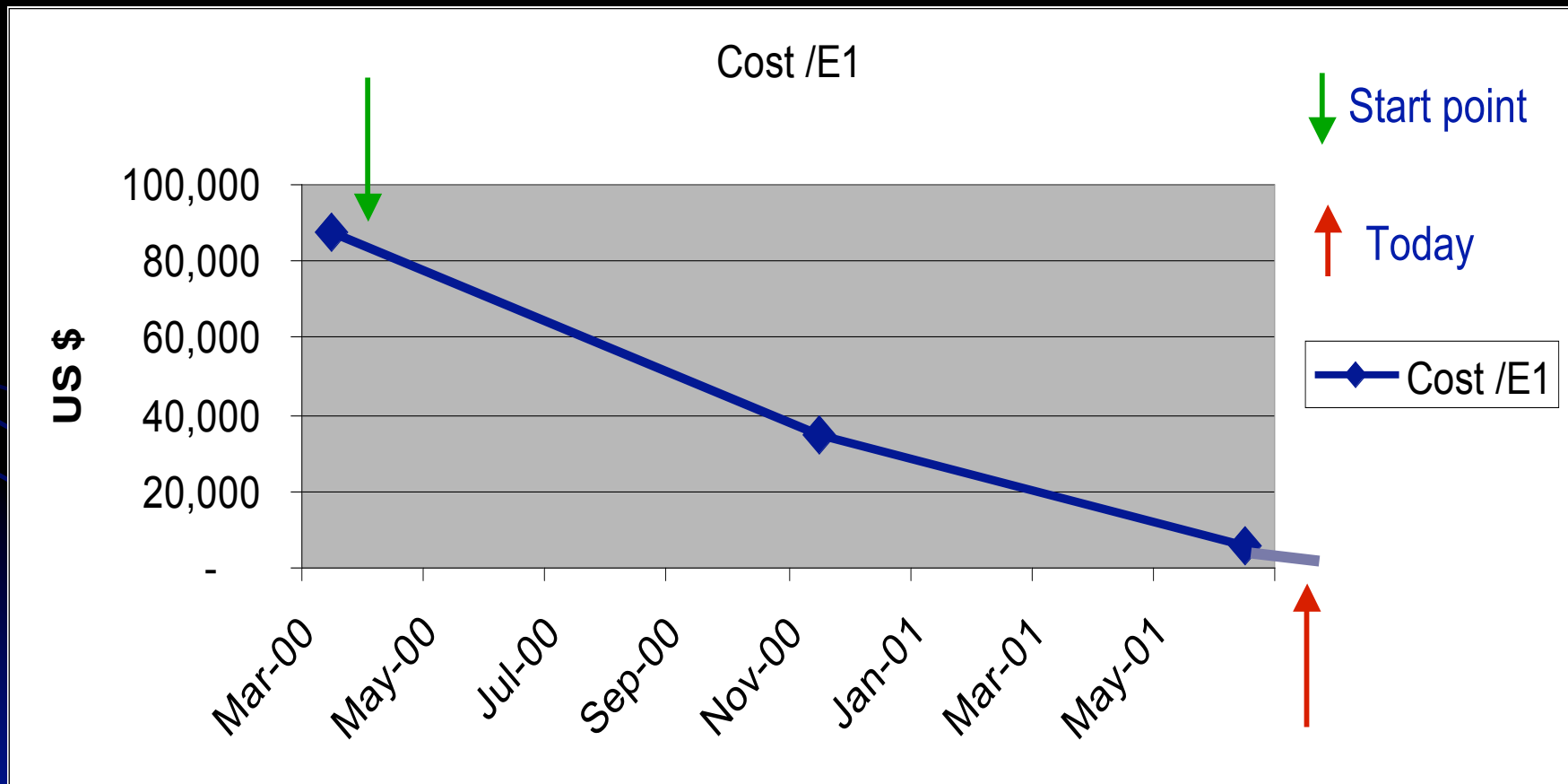
Plummeting costs....

JUNE 2000: US\$ 87,000/E1

AUGUST 2001: US\$ 6,000

OCTOBER 2004 : US\$ 3,800

Now US\$ 950 PER MONTH/2 MB/s !

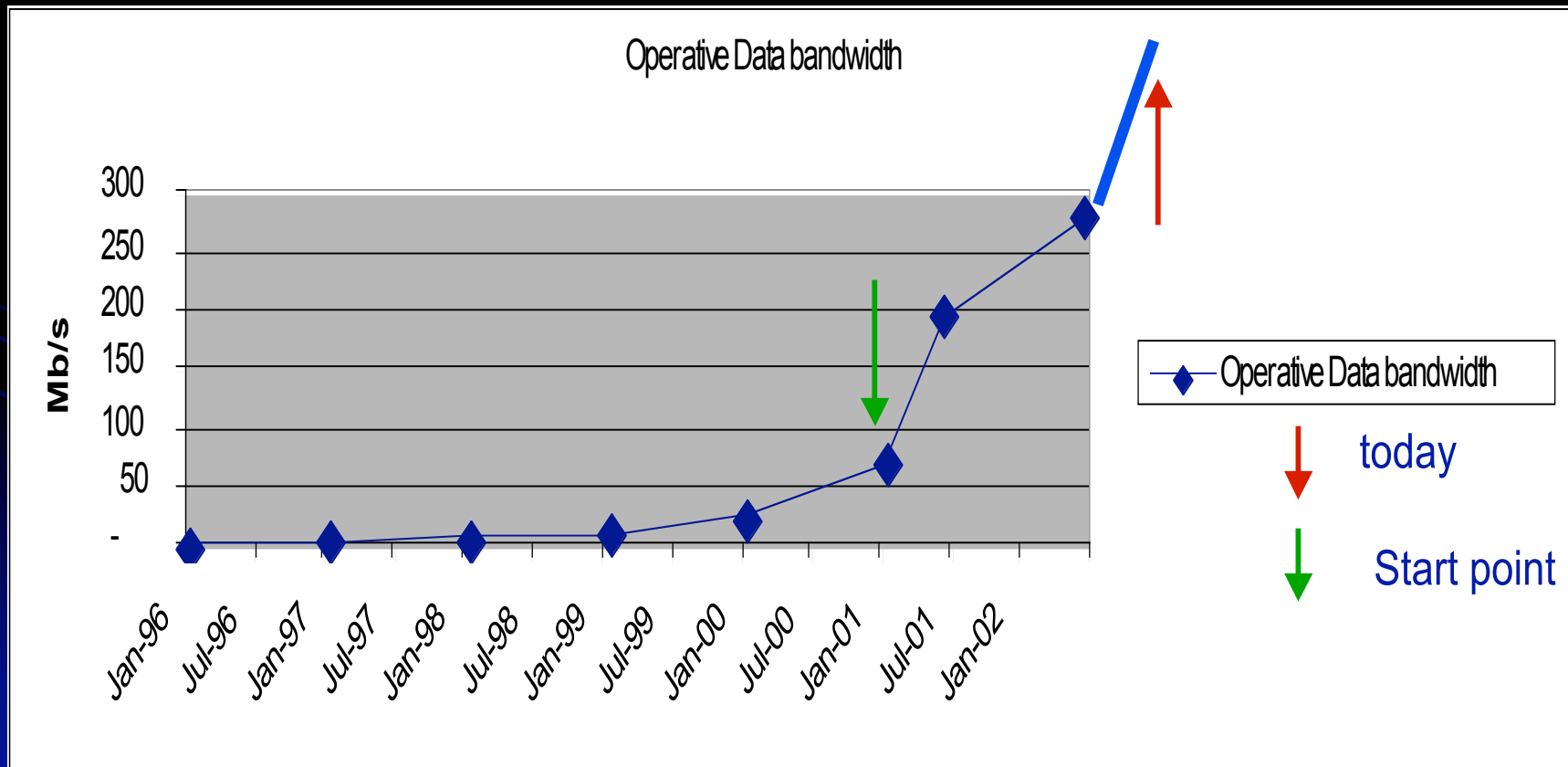


Bandwidth Available

AUGUST 2000: 32 MB/S

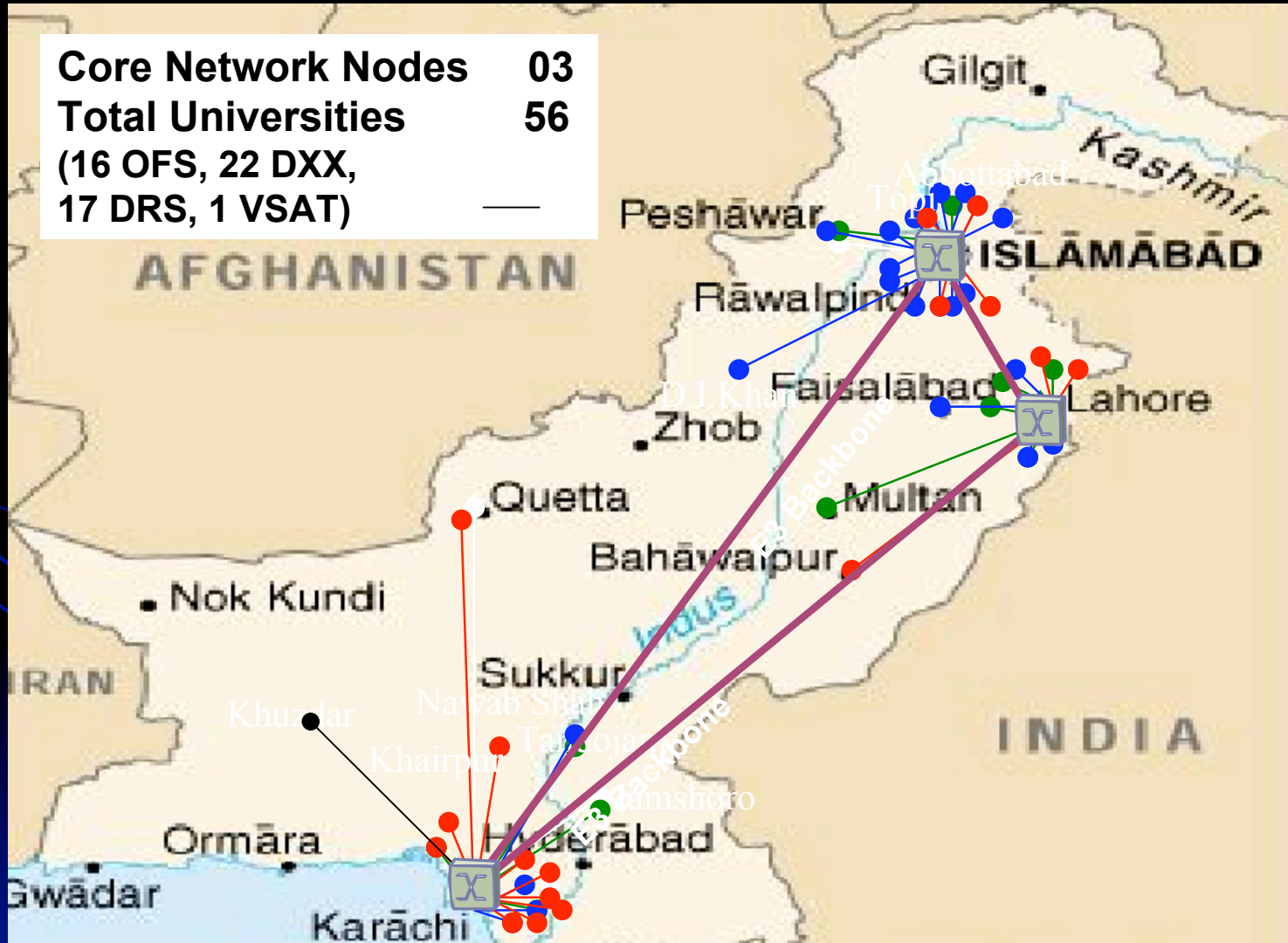
MAR 2002: 265 MB/S

2006: 10 GB/S LOOPS




PERN

Pakistan Education & Research Network



Pakistan Education and Research Network

- Information highway
 - Platform for launching aggressive distance education programs
 - Platform for Digital Library service for all universities
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Digital Library

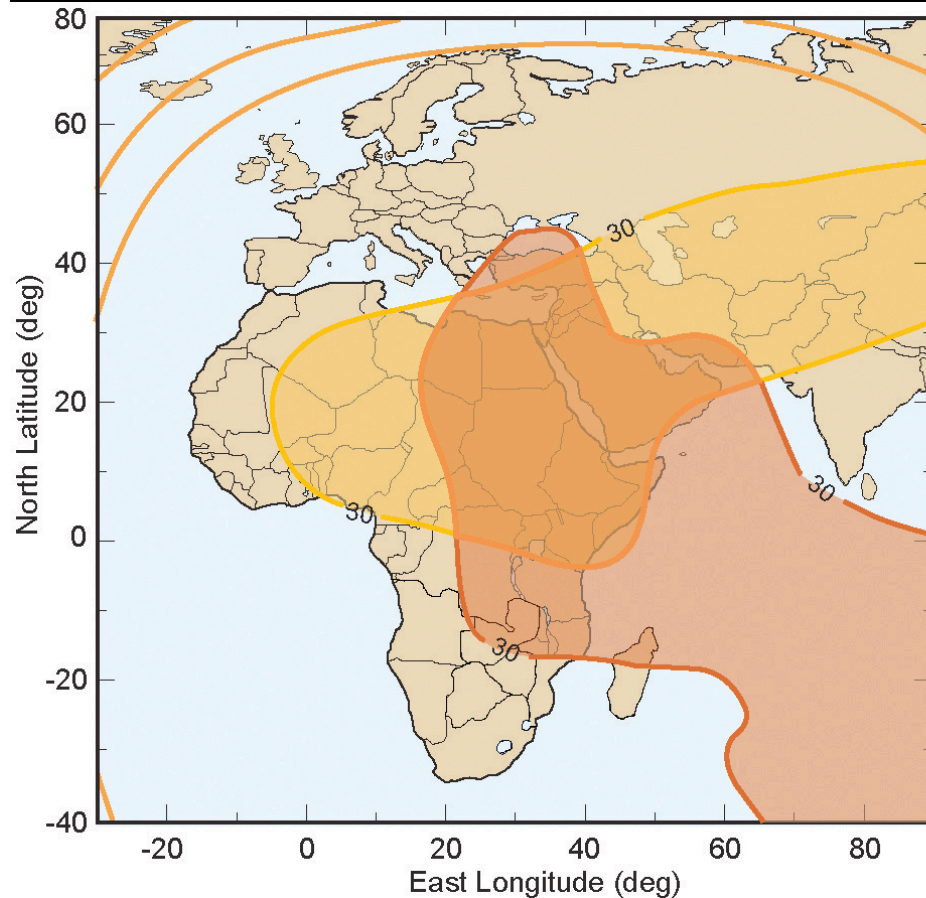
- 22,000 full text journals—nation-wide, free-of-charge!!!
- Over 12 million articles downloaded in 2006 !!
- Almost 300,000 end users trained nationwide
- One Window Search Engine
- Web of Science, Scifinder Scholar, EMBASE, IEEE, Chem/Biol.Abstracts etc.

Virtual University

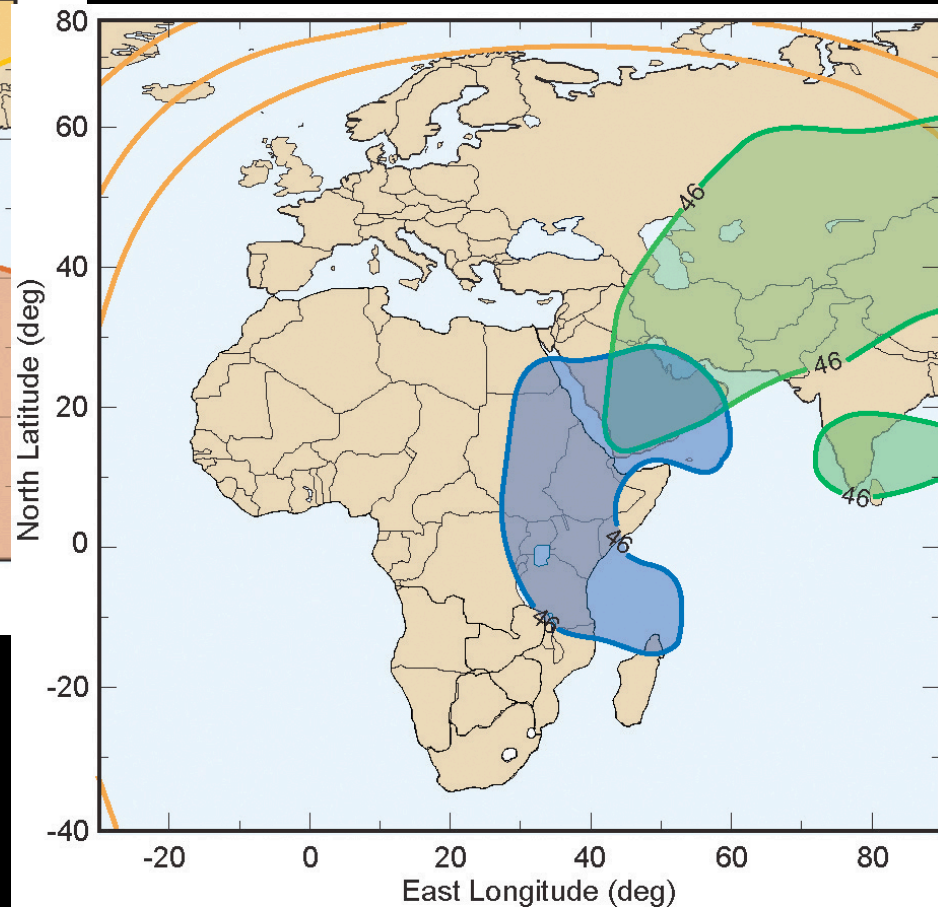
- 4 Digital Satellite (PAKSAT-1) TV Channels for content delivery (License for 2 granted)
- Satellite Earth Station
- 2 Recording Studios
- Potential for providing high quality training in remote areas of Pakistan

Paksat 1

Ku Band

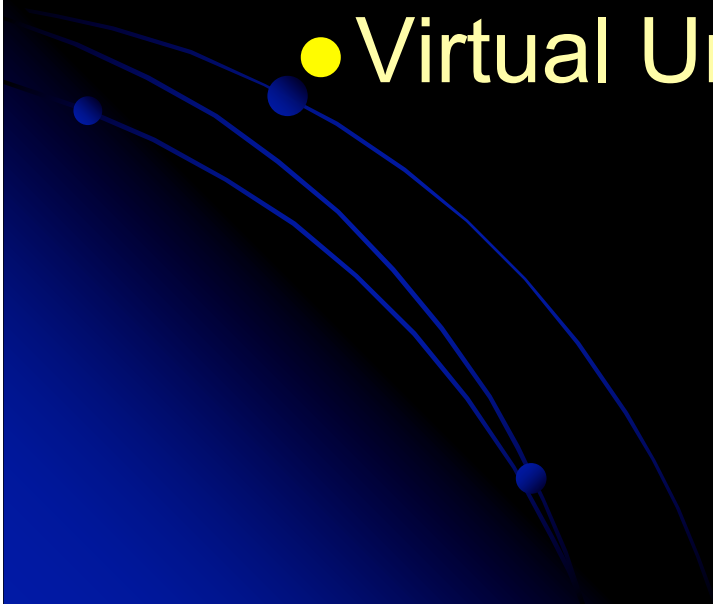


C-Band



Distance Learning

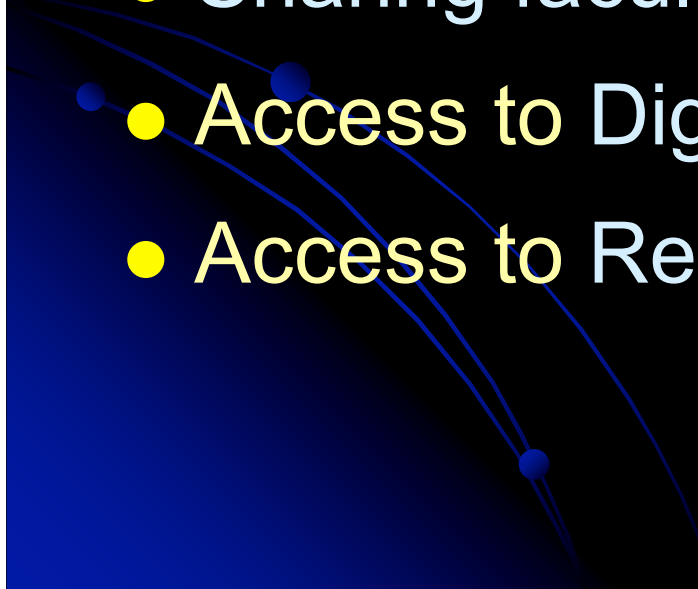
- MIT Open Courseware
- University of California Television
- E-Books Program
- Virtual University



International Video-lecturing Program

- High quality video-conferencing equipment installed
- Series of international lectures (nation-wide) by Nobel Laureates and top professors from leading universities in USA, Europe, Japan etc. from November 2006
- 4000 Lectures scheduled !!!

Supporting Private Sector Education

- Matching grants for new institutions
 - Major funds for development
 - Land on long term lease
 - Sharing faculty salaries
 - Access to Digital Library
 - Access to Research Funding
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Research and Sustainable Development

- Basic versus Applied Research
 - University versus Research Institutes
 - Focus on Key Fields
 - Linkage with National Development
 - International Linkages
 - ***Technology Foresight***
- 

Approach: *Focus, Focus, Focus*

- Prepare a **prioritized list** of “Doable” projects of National importance in each sector
- Clearly **identify**
 - What is to be done?
 - Who will do it?
 - Implementation timeframe ?
 - Human Resource Requirements ?
 - Cost of Project ?
 - Where possible, “Impact on National Economy” ?

Methodology

- **Study** undertaken: Pakistan Council for Science & Technology, Pakistan Institute of Development Economics **12 Committees** (over 200 eminent Scientists, Engineers, Planners, Economists and Private Sector Representatives).
- **Consultation** with **Federal / Provincial** Ministries
- Consultation with **Govt.** Research Institutes
- Consultation with **private sector**
- **Intensive Brainstorming Sessions:**
 - SWOT Analysis
 - Strategies Identified
 - Action plan prepared in each field
 - *Identify important projects for implementing the action plan*

Areas

- **Agriculture**
- **Biotechnology**
- **New Materials**
- **Chemicals and Pharmaceuticals**
- **Engineering Goods**
- **Electronics**
- **Energy / Power**
- **Telecommunications**
- **Information Technology**
- **Transportation**
- **Strategic Industries / Technologies**

Innovation & Sustainable Development

- **Teaching** “Innovation & Entrepreneurship”-----a proactive approach
- VC Funding
- Incentives for Private sector R&D (15 Year Tax Holiday)
- STED program
- S & T Policies
- IPR

- Incentives for Innovators (prizes, financial support for projects etc.)
- Interaction between Producers and Users of Knowledge
- Clusters of “Innovative” universities, with groups of industries
- Reducing “Time to Market”
- Identify and strengthen “Centres of Excellence”

Results

- 330% in ISI abstracted publications over last 4 years----rate of increase highest in Islamic world
- Young men and women have started opting to adopt careers in S&T subjects as first choice
- Landscape of Universities has begun to change

Independent Review of HEC

(World Bank)

- **“A Silent Revolution”**
- **“The successful track record of HEC is a good omen for the future”**
- **“Since its inception it has been startlingly active and has shaken up the world of universities”**

International Recognition

- Editorial in **Nature** ----29th January 2004:

“Rahman has convinced Musharraf and a deluge of money and new initiatives has poured out. Ministry of Science and Technology’s annual budget has increased 60 fold compared with 1999; researchers have an opportunity to more than double their earnings if they publish more in peer-reviewed journals; funds have been released for many more Ph.Ds. to be trained at home and abroad; plans are well under way for a free digital library for all educational institutions; there is a new scheme to attract researchers from overseas to work in Pakistan-----

Real Wealth--

- **Our Children---**with a population of 156 million, about a 100 million below the age of 25, Pakistan is blessed with a huge pool of creativity
- **Challenge** is to empower them with quality education and skills---and provide them opportunities to contribute to the process of socio-economic development

Message to Developing World

- ***Stop looking to others to help you !
You must rise and develop yourself !***
- Every country acts in its own self-interest!
- Political Will in Leadership !
- Courage to dream great dreams---and work—to make them come true



NUCLEAR MAGNETIC RESONANCE SPECTROMETERS



A young boy with dark hair and freckles, wearing a dark blue sweater over a white collared shirt, is the central focus. He is smiling and looking directly at the camera. In the background, to the left, a girl with dark braids is looking down at an open book. To the right, another boy is partially visible, also looking down. The background is a classroom with a blue wall and several framed pictures. The text "Education, Education, Higher Education" is overlaid in large, white, bold letters across the center of the image.

**Education,
Education,
Higher Education**

Thanks

