

# Affordable Wireless Connectivity in Rural Areas

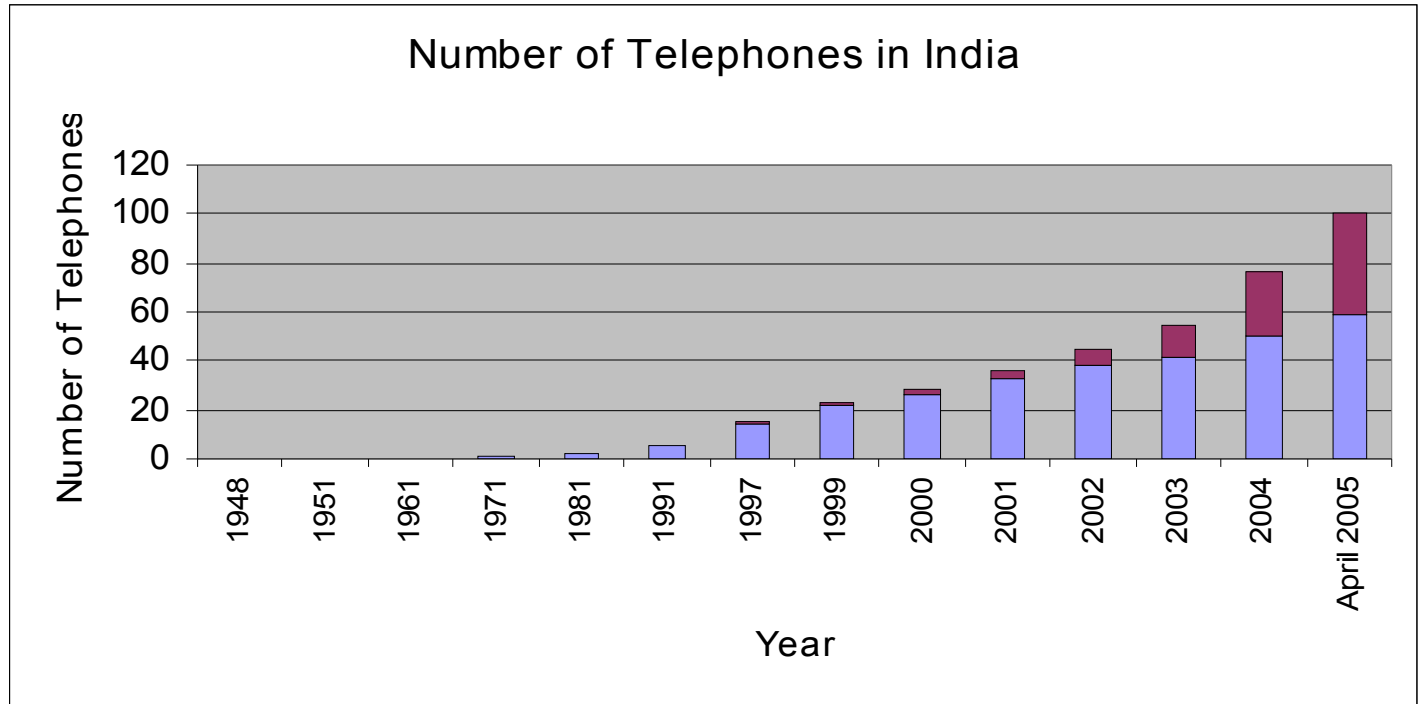
Taking India as an example

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# Outline

- ♦ Introduction: Telecom Boom in India
- ♦ Connecting Rural India
  - Technologies: Today and tomorrow
- ♦ Communications and Development
  - Internet enables leapfrogging and overcoming two hundred years of denial of opportunities

Wireless has enabled India reach 1994 dream of crossing 100 million telephone lines in a decade



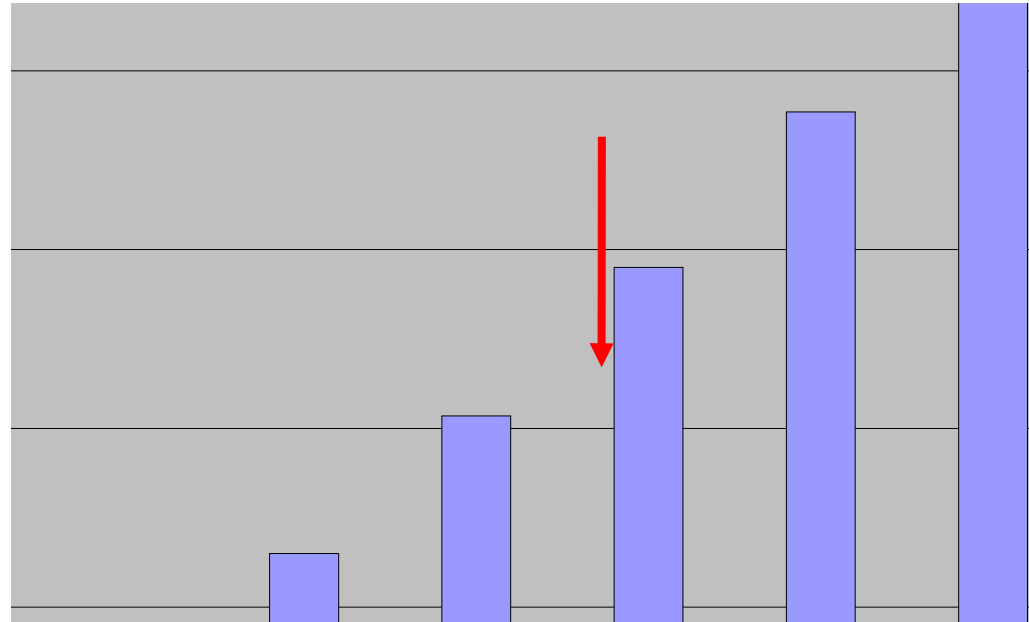
How has this happened?

can rural telecom grow in a similar manner?

# Mobile Market in India boomed

5 million  $\Rightarrow$  50 million  $\Rightarrow$  150 million  $\Rightarrow$  400 million

- ♦ with handset price of US\$40 plus
- ♦ Infrastructure cost reduces to enable
  - service at 1.5 cents per minute
  - and ARPU of \$ 7 per month



- ♦ Need a different price point for the next 300 million rural subscribers
  - Service at 0.5 cents per minute
  - ARPU of US\$ 2 per month

# Rural India has 700 million people

- ♦ in 600,000+ villages (about 1000 people per village with per-capita income of US\$0.50 per day)



135 million rural households



1,30

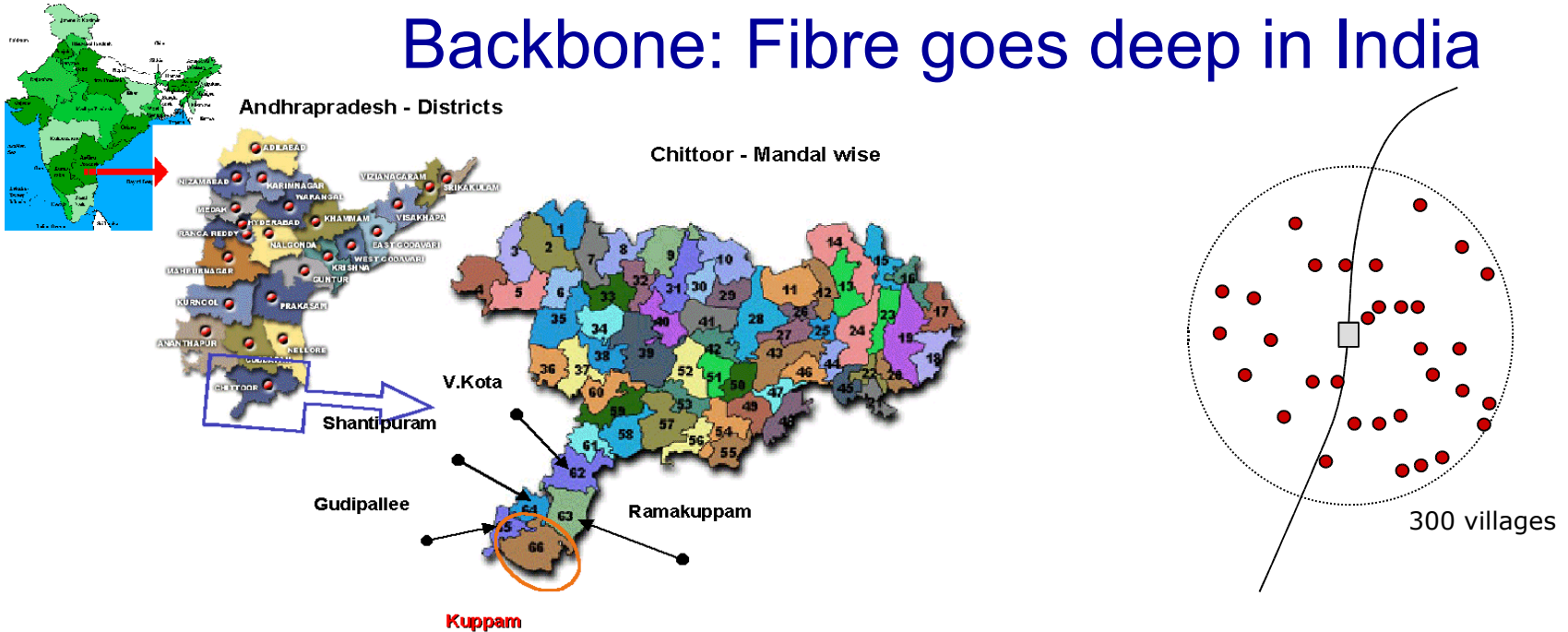
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- ♦ In addition to telephony, Internet plays a great role to bring in Education, Health & Micro-enterprises
- ♦ To scale to 600K villages
  - Technologies
  - Sustainable Business Model
  - Organisation which thinks and acts Rural

# Connecting Rural India

- ◆ Backbone Network
- ◆ Access Technologies

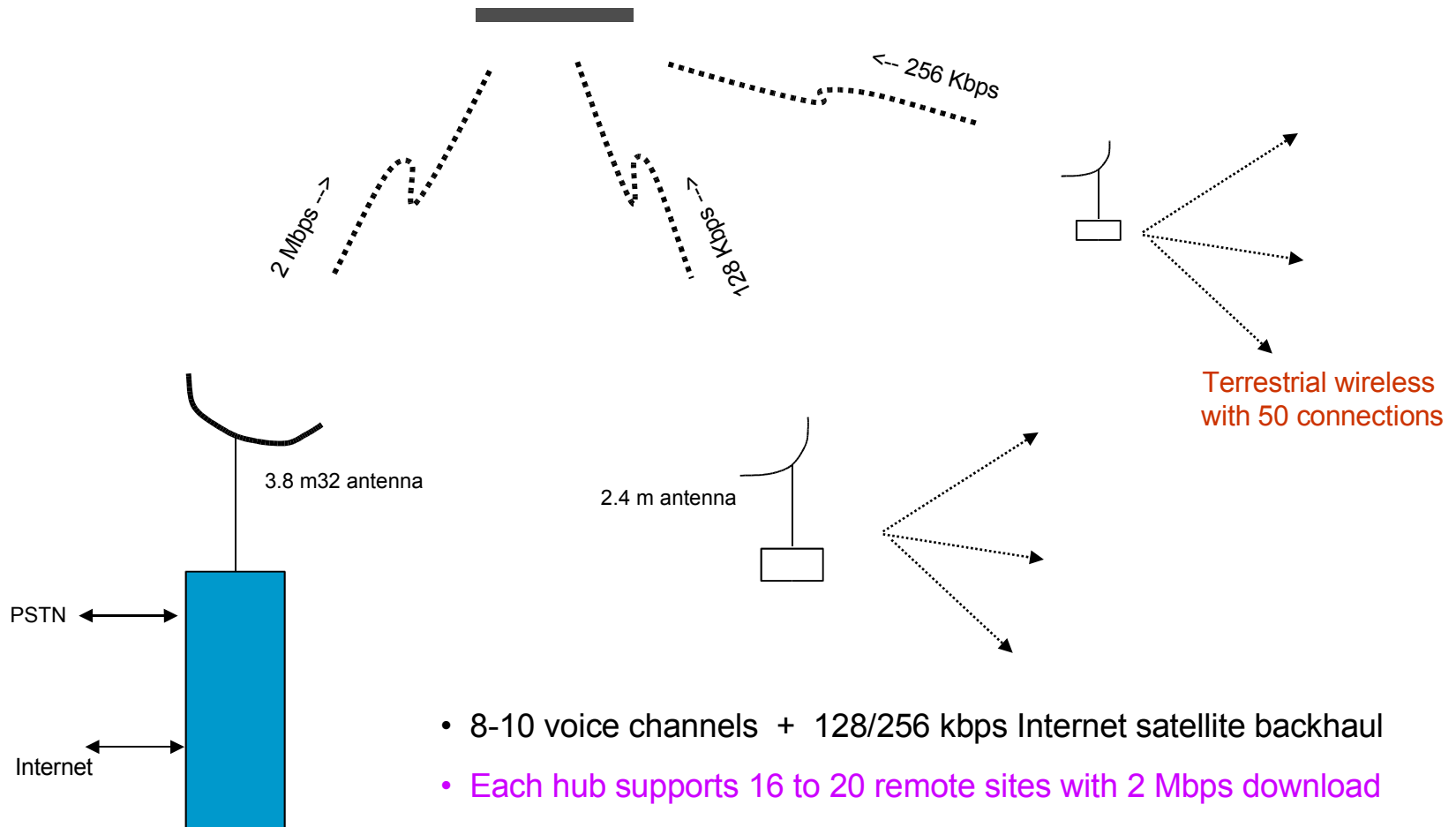
# Backbone: Fibre goes deep in India



- ♦ BSNL, Tata, Reliance, Bharati, Railtel has fibre connectivity to most County (taluka: 15 Km radius) towns
  - Privatization has brought down prices drastically
- ♦ Lease fibre BW to make a Rural backbone network
  - WiFi use often to connect to backbone
  - 85% of villages within 20-25 Km radius of taluka towns
    - typically 300 villages in 30 Km radius

# Sparse Area Communications

where there is no fibre backbone



- 8-10 voice channels + 128/256 kbps Internet satellite backhaul
- Each hub supports 16 to 20 remote sites with 2 Mbps download
- US\$ 200 backhaul cost per connection

# Access Technologies

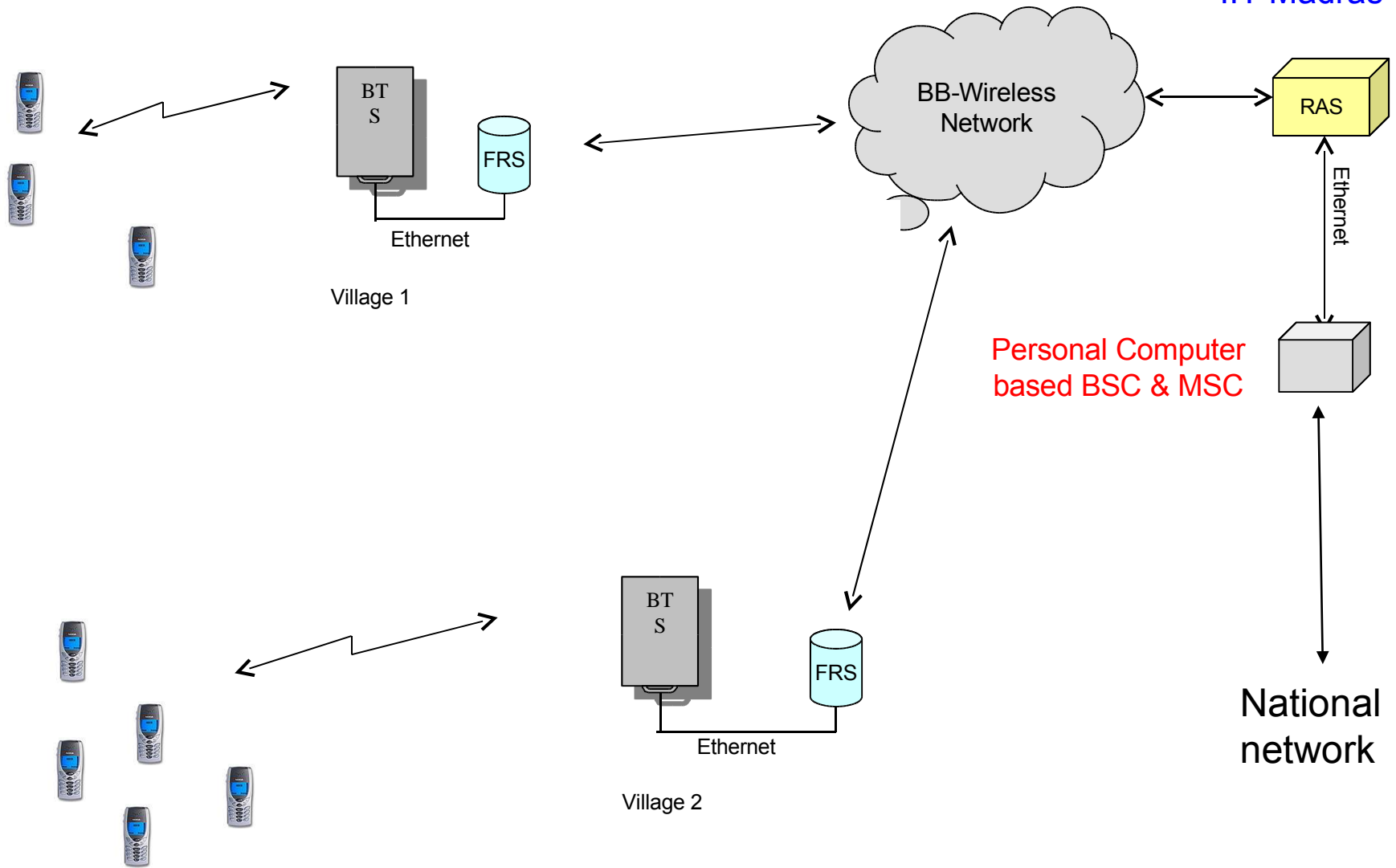
- ♦ Wireless technologies are continuously evolving
  - costs come down and bit rates go on increasing year after year
  - GSM / CDMA : Mobility, Voice, SMS, low-bit rate Internet
  - BB-corDECT: Fixed, Voice, Broadband Internet
  - WiMax, Flash-OFDMA, iBurst: Mobility, Voice, Broadband Internet

# Is differential pricing possible?

- ♦ Can connect GSM / CDMA Base Station on towers at Taluka headquarters and provide coverage to villages in 20-25 Kms radius
  - Mobile coverage at this radius may be difficult
  - Incapable of using different price points in towns and in rural areas
  - Rural affordability will drive down urban ARPU
  
- ♦ Alternative:
  - Rural GSM / CDMA Base Station in each village
    - Enables differential tariff for phones registered in the village and making calls from the village

# GSM connectivity in a village (towards \$ 2 ARPU)

TEIET  
IIT Madras



# Rural Wireless Access – Costs Vs Benefits

- ♦ Other costs for wireless from County / Taluka HQ to each village
  - LOS Tower cost: US\$ 25K
    - Can be substantial for three hundred village coverage unless multiple services are deployed
  - Spectrum costs
  
- ♦ So how does one make this economically viable?
  - Aggregate demand
  - Requires innovative business approach
  - Develop applications and services

# Business Model:

- ♦ Entrepreneur-driven operator assisted telephone booths introduced in 1987
  - 950,000 such PCOs covering every street
  - generate 25 % of total telecom income serving 300 million people
- ♦ Lesson for Rural India:
  - To serve Rural people with incomes less than \$ 1/day, aggregate demand at every village and let Entrepreneurs drive it
    - No one should have to walk more than 500 m to access services
    - Provide as many services as possible

Aid/ Grant does not scale  
Successful Enterprises can scale to all villages



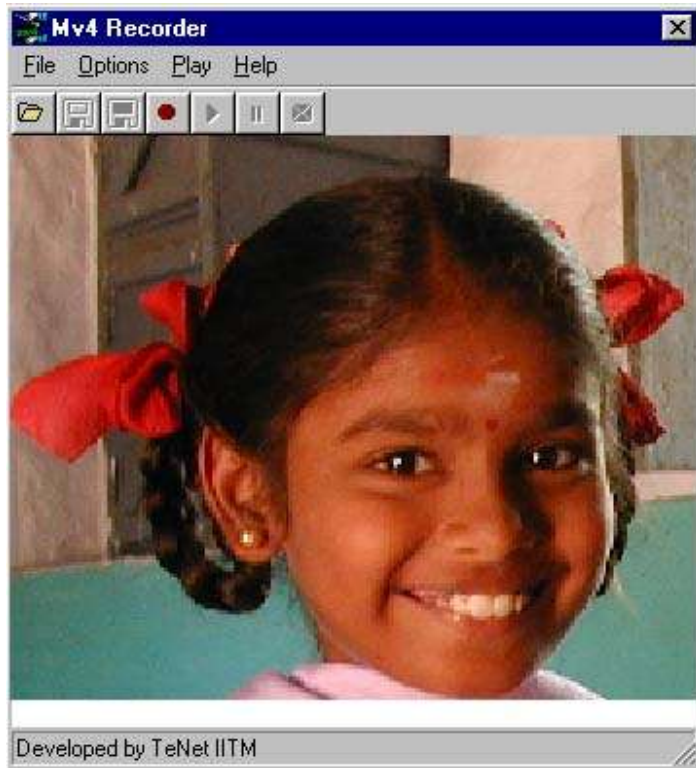
# Tasks and Services

- ♦ Infrastructure
- ♦ Capacity Building
- ♦ End to End Services using ICT
  - Basic Services (email, browsing, games, DTP, astrology, matrimonial, photography)
  - Communication Services (VoIP, Mobile)
  - Education
  - Micro-franchise
  - ITeS
  - Telemedicine
  - Agriculture
  - Financial Services
  - Jobs
  - Buying and Selling
  - E-governance
  - Micro-enterprise
  - Online Games

# Tomorrow's kiosk

- ♦ Tomorrow the kiosk should become
    - a communication hub: providing 50 telephone and Internet connection in a village
    - a center for virtual university / training center
      - technology support center
    - a support center for Entrepreneurship
    - a banking outlet
      - micro-finance outlet
    - a trading outlet
      - agri-support center
    - a medical support center
- and more

# To Sum Up



Technologies are now starting to be available to connect every village of the world

- ❑ Can significantly enhance the opportunities for 5 billion Rural people in developing world
- ❑ Agriculture Support key to Rural Wealth
- ❑ Power Supply will be key bottleneck
  - Entrepreneur sets up (20-50KVA) back-up power plant and distribute in the village
  - initially with diesel, later with bio-diesel