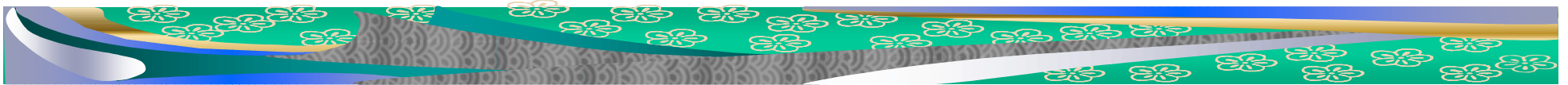


Can Internet provide  
opportunity for the 5 billion unconnected in developing  
economies to leap-frog



*using Rural India as an example*

Prof. Ashok Jhunjhunwala, IITM, Chennai, India  
[ashok@tenet.res.in](mailto:ashok@tenet.res.in)

# Power of Internet

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- Internet provides an Opportunity for Developing Economies
  - to stand up and be counted in the world
  - leave two hundred years of colonisation, slavery and resulting lack of confidence behind
  - How?
    - So far one needed to be in the developed part of the world
      - to get access to resources and education
      - to be able to compete
      - to be able to use one's ingenuity and hard work for one's economic and social benefit
  - Now, for the first time, the distance does not matter

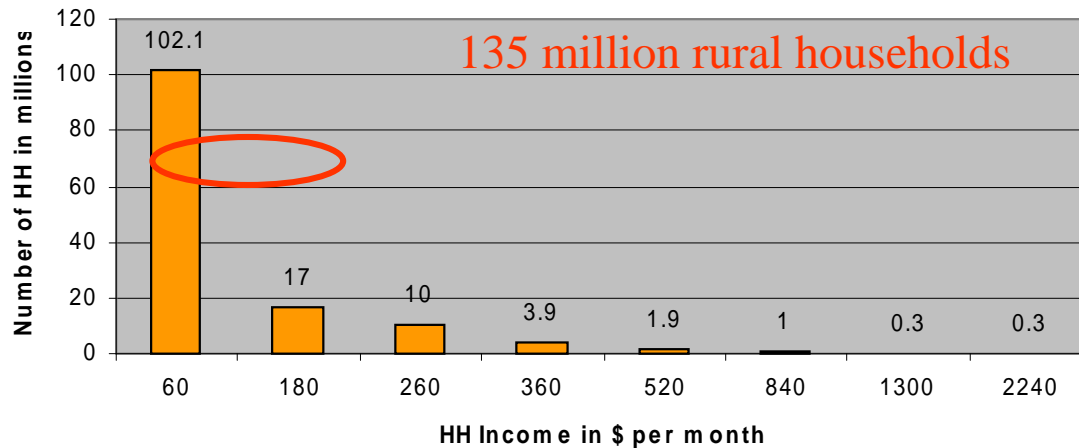
# Rural Population of Developing Countries is 3.5 billion

- ❑ But per capita income is no more than \$ 200 per year
- ❑ India has a 700 million
  - represents average of developing economies in terms of Population Vs Income
  - in 600,000+ villages in India (about 1000 people per village with per-capita income of \$ 0.40 per day)



- ❑ Can technologies make a significant difference in life of such people?

- Can it bring to them health & Education
- Can it significantly enhance their incomes?



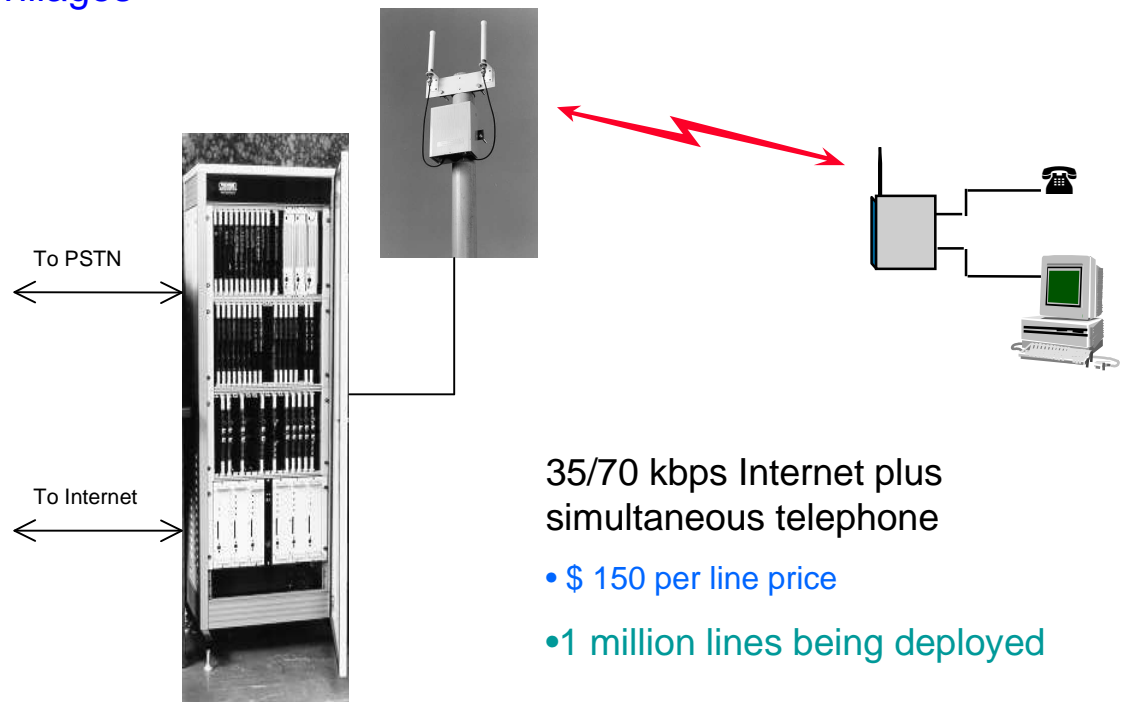
# To Scale to all the villages in India

---

- ▣ One needs
  - Technology
  - Sustainable Business Model
  - Organisation which thinks and acts Rural

# Innovative Technology to connect Rural India

- BSNL (state owned incumbent) has fibre connectivity to most county headquarters (taluka)
  - CorDECT Wireless in Local Loop developed at IITM, India
    - provides a telephone line and Internet connection in a 30 Km radius
    - can connect 85% of Indian villages
    - start-up costs very low



35/70 kbps Internet plus simultaneous telephone

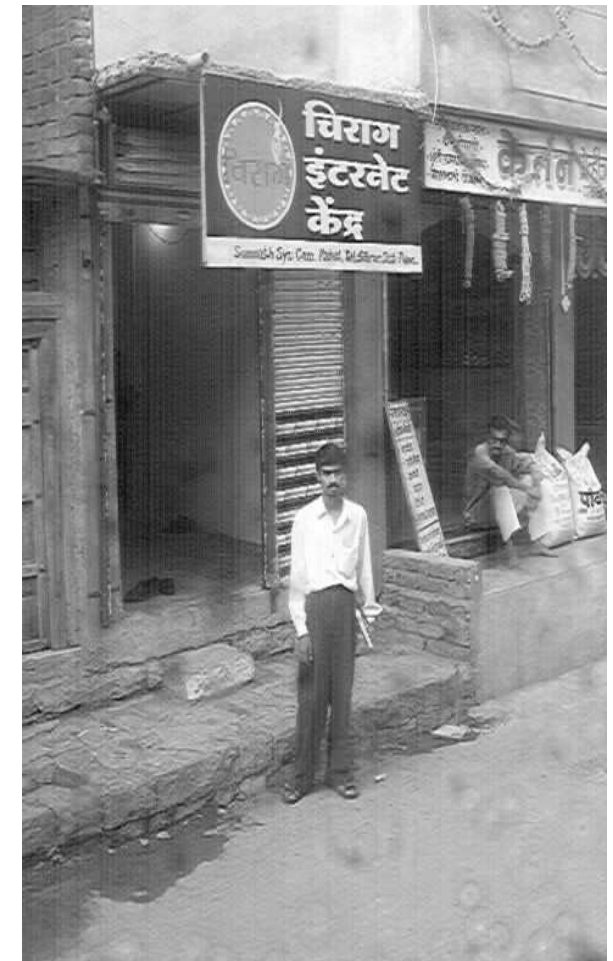
- \$ 150 per line price
- 1 million lines being deployed

# Business Model:

## Use Local Entrepreneurs to drive ICT

- ❑ Entrepreneur-driven operator assisted telephone booths (STD PCOs) introduced in India in 1987
  - Today in urban areas:
    - 950,000 such PCOs covering every street of smallest town
    - generate 25 % of total telecom income
    - 300 million people use these PCOs
- ❑ Lesson for Rural:
  - To serve Rural people with incomes less than \$ 1/day, aggregate demand and let Entrepreneurs drive it

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



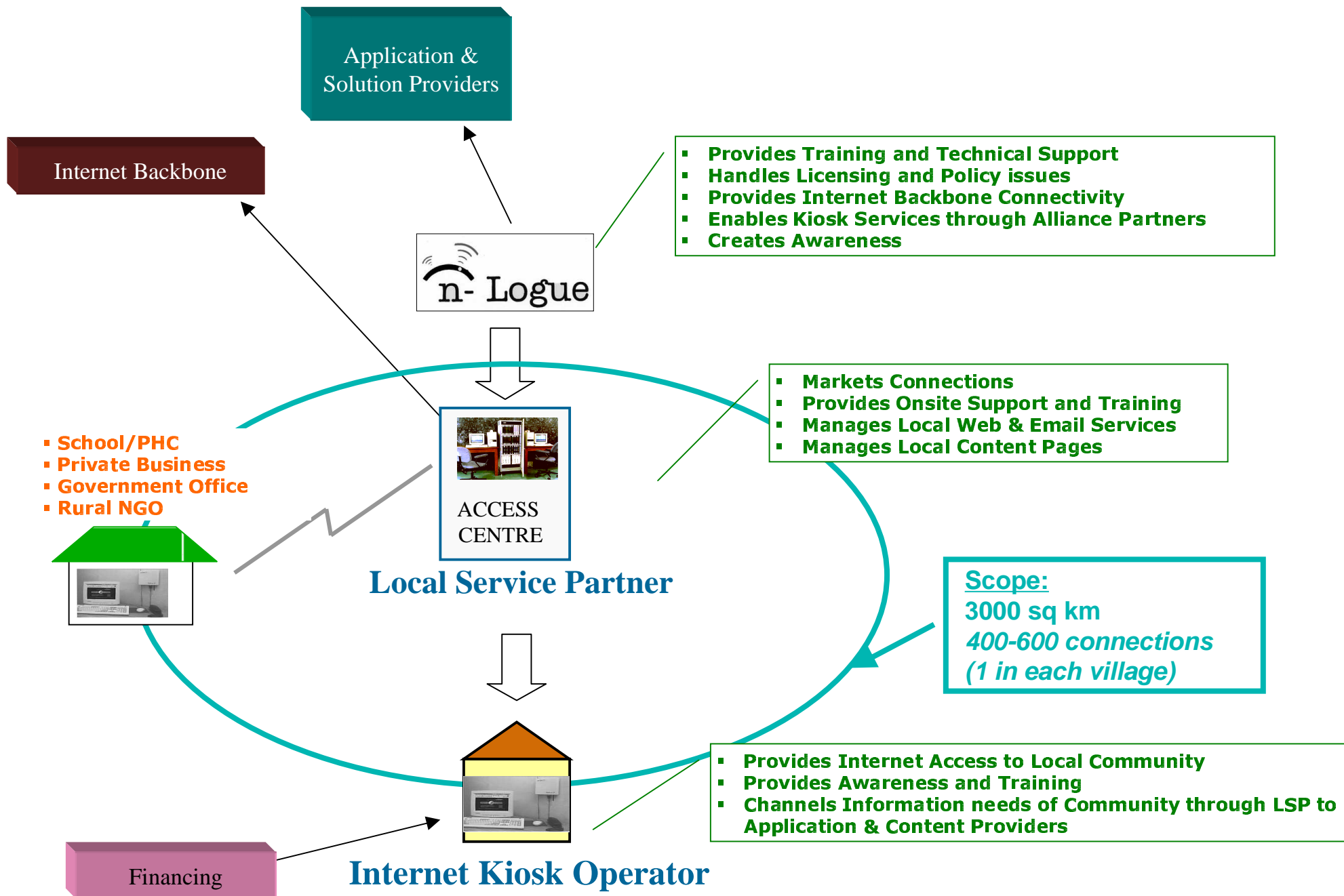
# Innovative Business Models

## ■ n-Logue : A Rural Service Provider

- aggregate demand into a kiosk
- owned & driven by a local entrepreneur
- \$1000 (including taxes) per Kiosk providing telephone, Internet, multimedia PC with web-camera, printer and power back-up for PC
  - plus Indian language software, video conferencing software, training and maintenance
- set up by a village entrepreneur on the lines of urban PCOs
  - provides telephone, stand-alone Computer and Internet services
  - needs \$75 per month to break even (7cents per person per month)









# The Kiosk Owner

---

- Should have studied up to Class 10
- Need have *no prior computer Training*
- Should be able to communicate to the people in the village



# Kiosk: Bouquet of Services (besides telephony)



- Learning typing
- Computer education
- Photography
- movies on CD
- DTP work
- Email/voice & video mail
- E-Government
- Video conferencing providing
  - Tele-medicine
  - Vet Care
  - E-learning
  - E-Agriculture

## The Vet is on the Net ...



- This goat had a wound near its mouth and could not eat for a week
- The advice from the doctor cured its problem in 2 days

**Rural Magic:** The next few slides contain true stories which have “magically” impacted the lives of people in Indian villages .



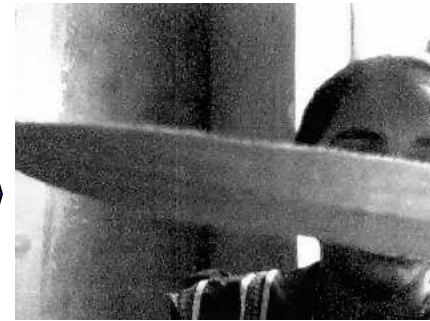
# Saving Crops and Agri-consultancy



***Before***

**In a Village in  
Madurai, the Lady's  
Finger (Okra) crop  
was turning white**

**The problem was  
sent to the  
experts at the  
Department of  
Rural Extension,  
Madurai  
Agricultural  
College and  
Research Centre  
who diagnosed it  
as "Yellow Mosaic  
disease"**



***After***



**Saving farmer-\$3500  
Cost of Information-a dollar**

# Palaniammal's eyes...

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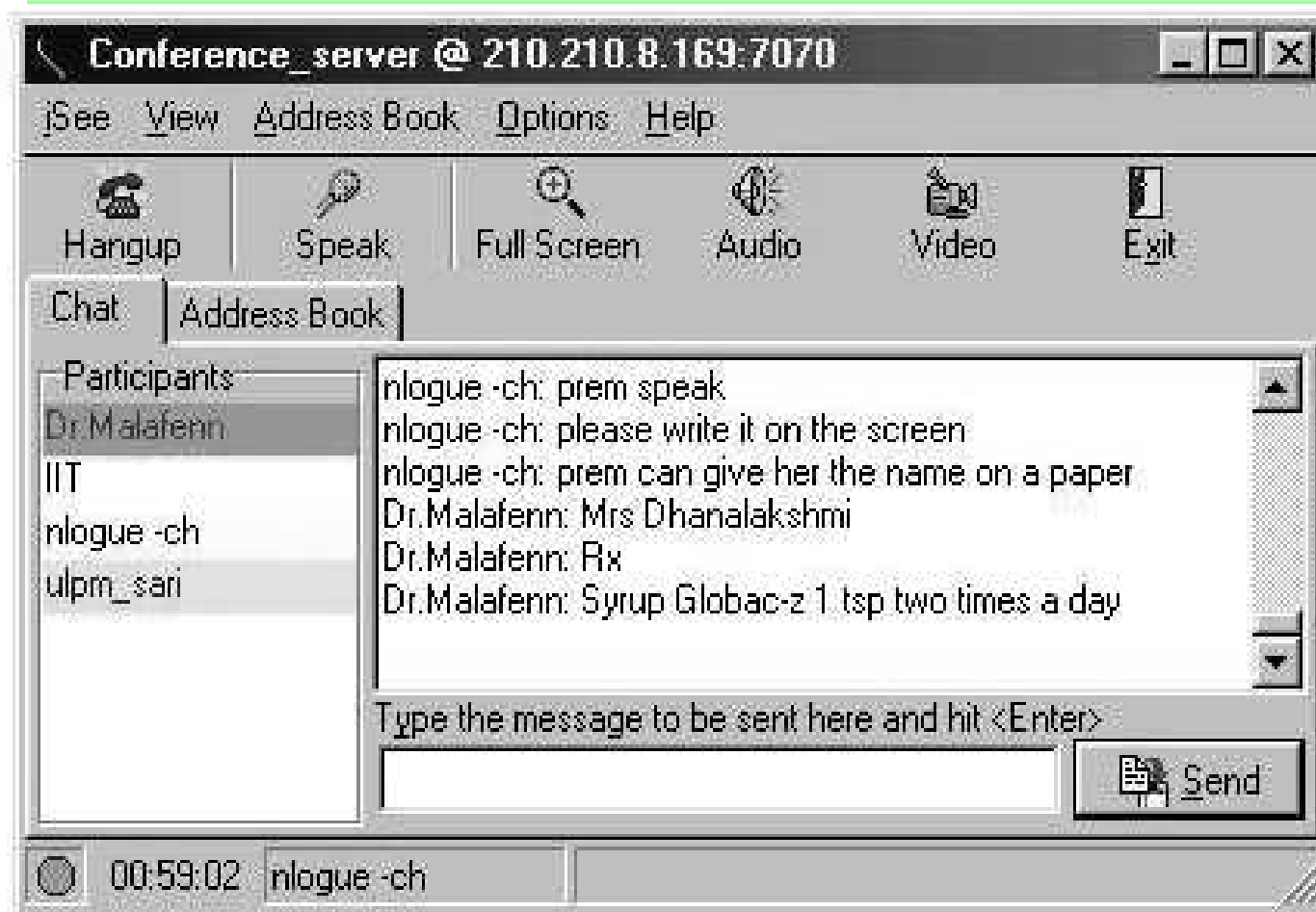
- A 60 year old from a village near Melur



Photographs by an ordinary web camera: Remote feedback given by Aravind Eye hospital

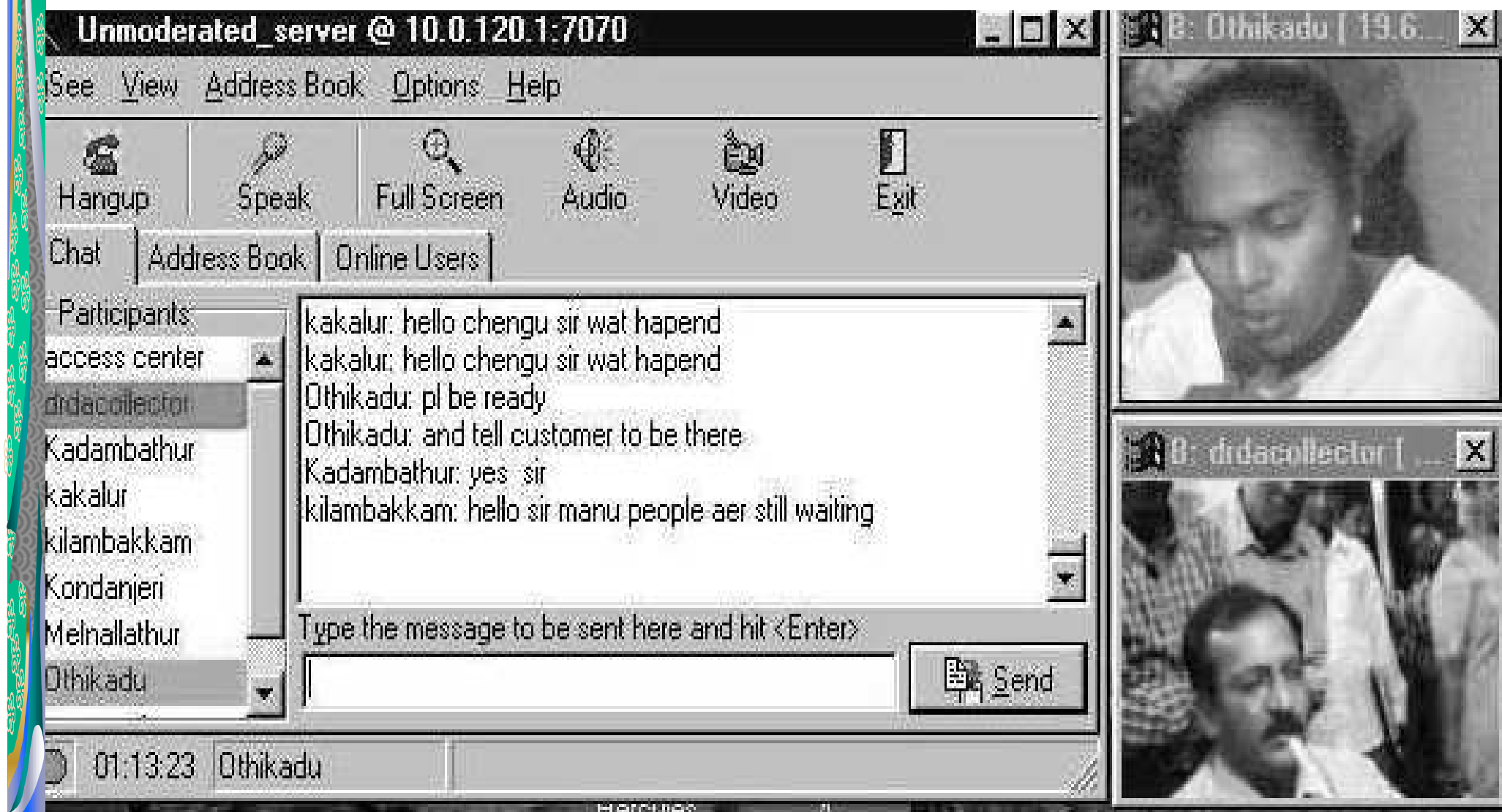


# An Online Clinic ...



\*Dr Mala Fenn is a leading Gynecologist in Madurai

# Web- Durbar: DM talks to multiple villages on video






C:\PROGRAM FILES\ISEE\Slide\_Show\earth\Slide\_2.wmf

Select Slide Show:


earth

<< < > >>




- Solar System
- Force of Gravitation.
- Formation of Earth
- Formation of Moon.
- Effect of Cooling.
- How oceans and rivers were formed.

B: Moderator [ 22.... X]



B: Anitha [ 23.19 ... X]



Moderated\_server @ 144.16.244.2:7072

See View Address Book Options Help

Chat | Address Book | Online Users

Participants

Anitha

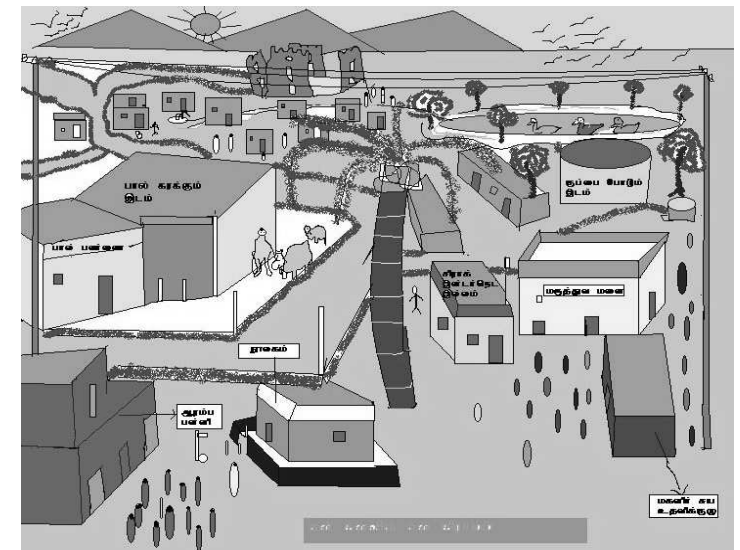
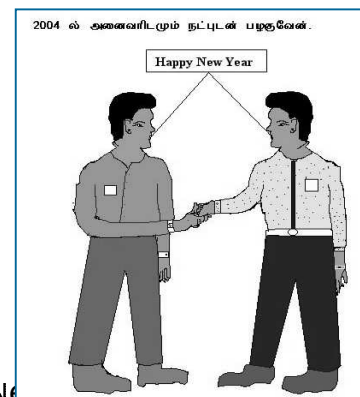
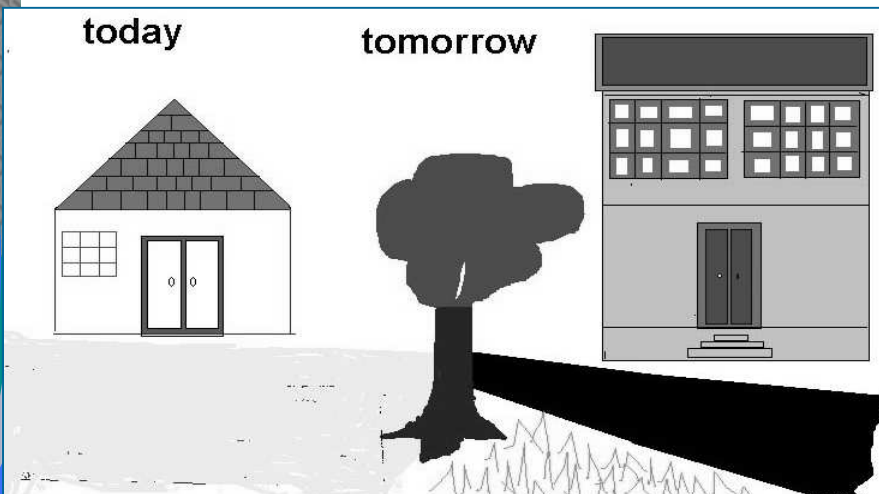
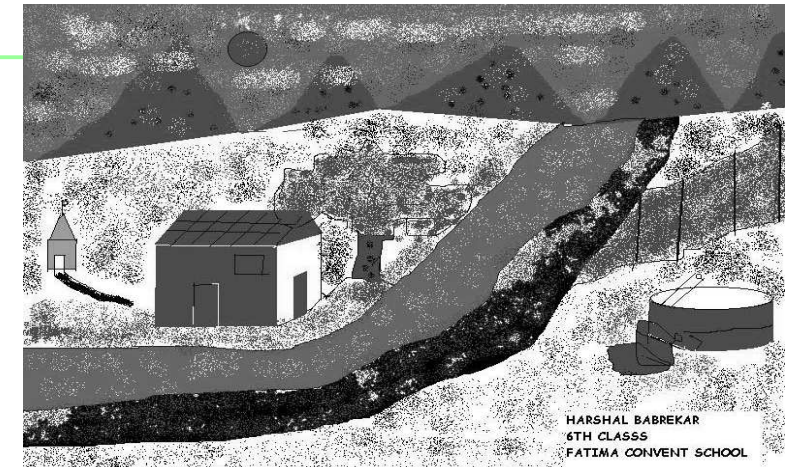
**Moderator**

Moderator: Good Morning Students  
 Moderator: Today we are going to see about long questions  
 Anitha: Ma'm I have a question

Type the message to be sent here and hit <Enter>

Send

# Rural Children create computer drawings for greeting cards



**AlldrawnonaPC**

# Technologies that makes this possible

---

- corDECT WiLL

- will enable 100/200 dedicated and 2 Mbps shared connection next year

- RAS & Router

- Minnow ISP in a box

- Billing System

- Network Management

- Indian Language Office package

Midas

Banyan

Nilgiri

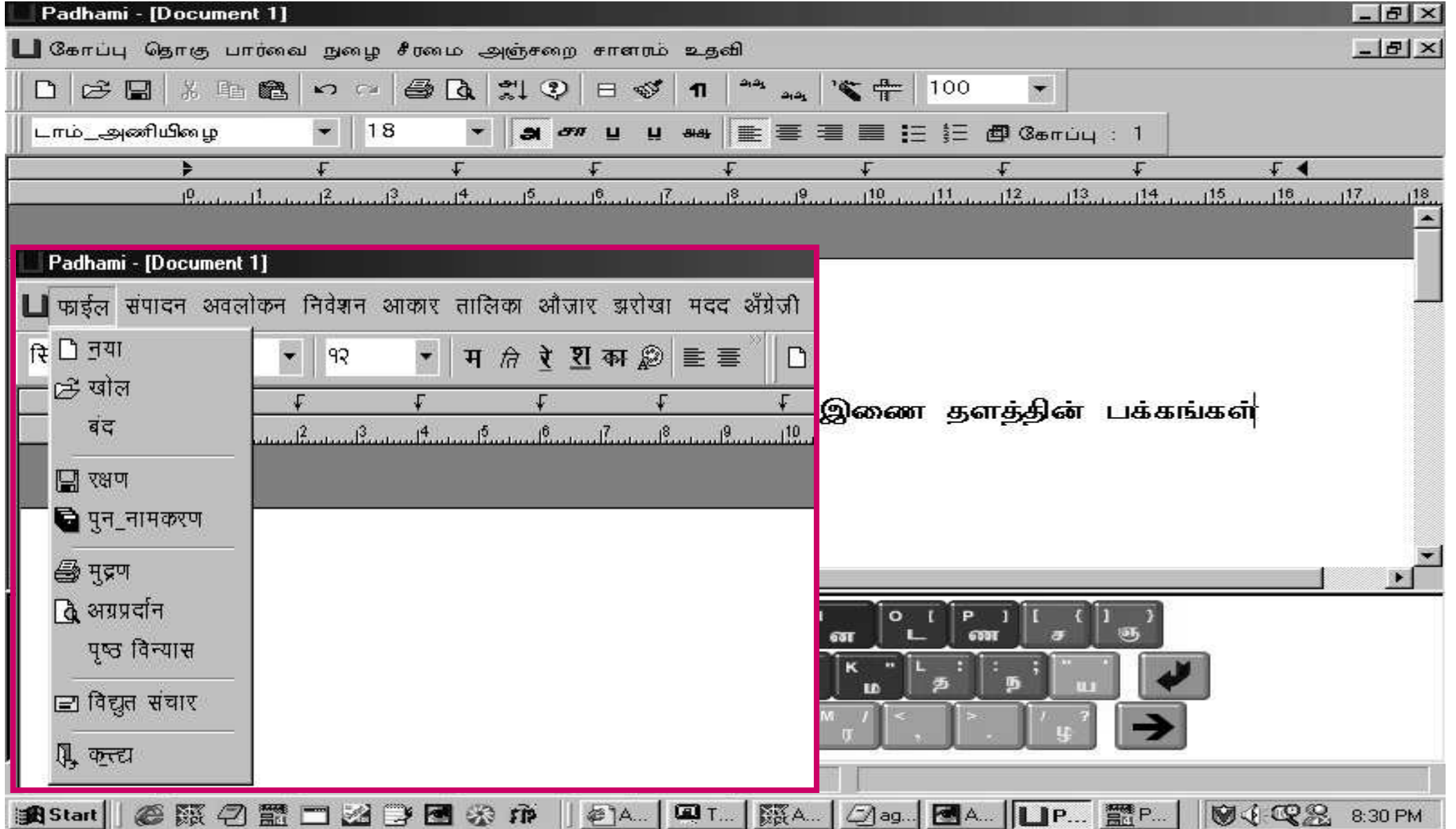
Nilgiri

NMSWorks

CK

# Office package in Indian Languages

IITM - Chennai Kavigal



# Major New Initiatives

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❑ Multi-party multi-rate video conferencing	OOPS
■ Live Lecture	OOPS
❑ Rural ATM Machine	Vortex
■ Finger print detection	HP-IITM
❑ Medical Diagnostic kit	Neurosynaptics
❑ LCD projection system	TeNeT
❑ Web Terminal MeTeL	Midas
■ Entertainment Terminal	TeNeT
❑ Rural Banking SW	TeNeT
❑ On-line eye-testing	HP-IITM
❑ Sparse Area Comm System	TeNeT

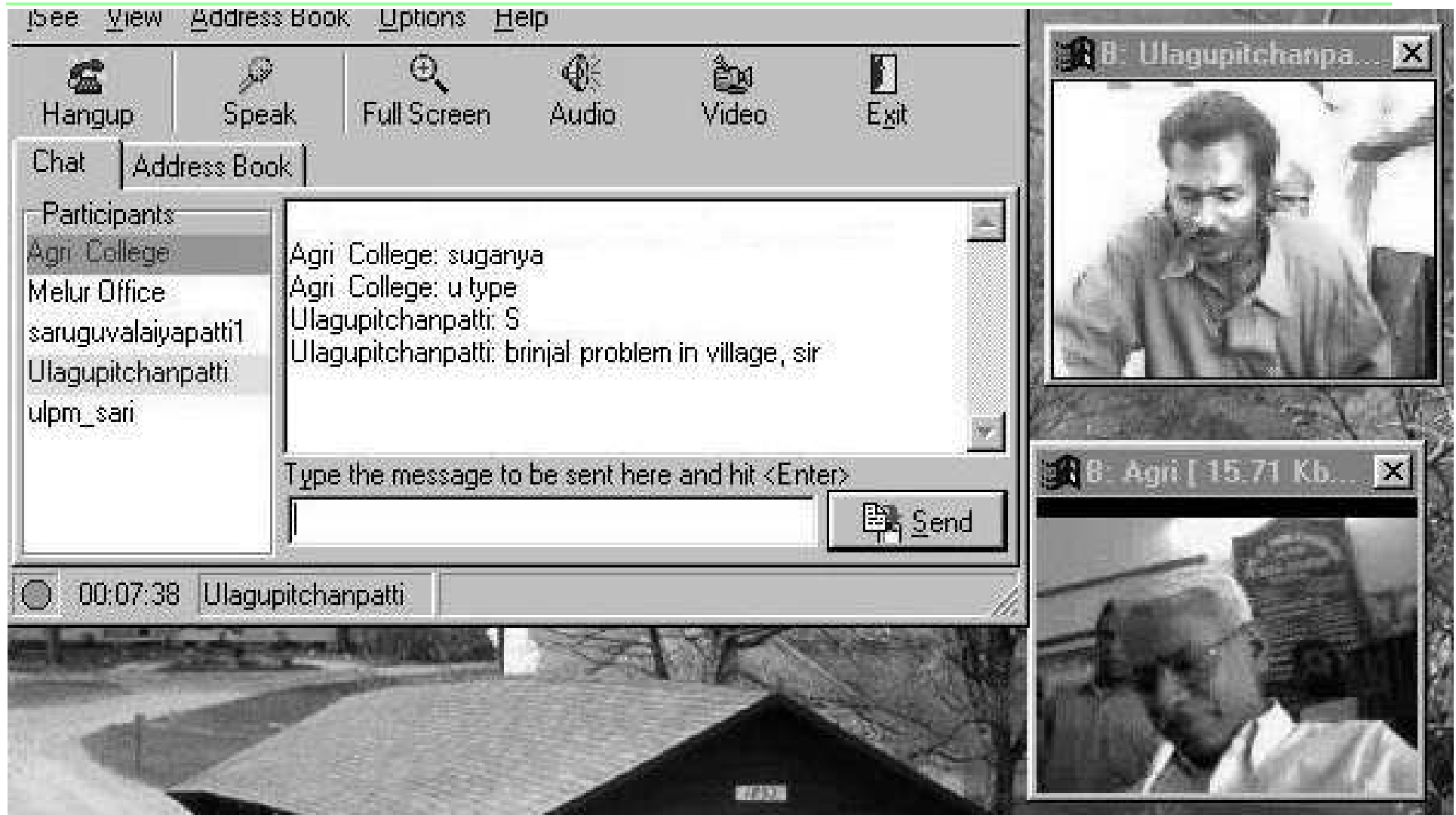
**TeNeT faculty and 10 companies incubated by it  
(1000 engineers) working to make the dream true**



# Low bit-rate multi-party Video Conferencing (audio + video + chat at 20 kbps onwards)

IITM - OOPS

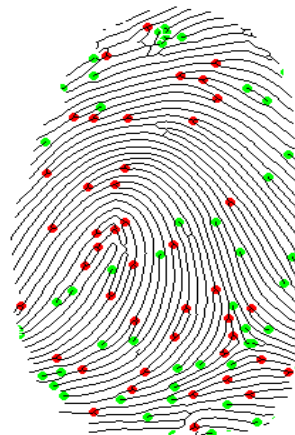
## On-line lecturing at low bit-rates



# Financial Services with ICICI Bank

IITM-Vortex

- Kiosk operators to have Credit cards
  - Collect cash from villager and pay online
    - Govt. payments, Telephone bills
    - Kiosk operator to be an agent for
      - agri-crop loans
      - Rural Insurance, Health and Crop
  - Rural low cost ATMs at kiosks
    - Works along with the PC already existing
    - Breakthrough pricing envisaged of \$ 800



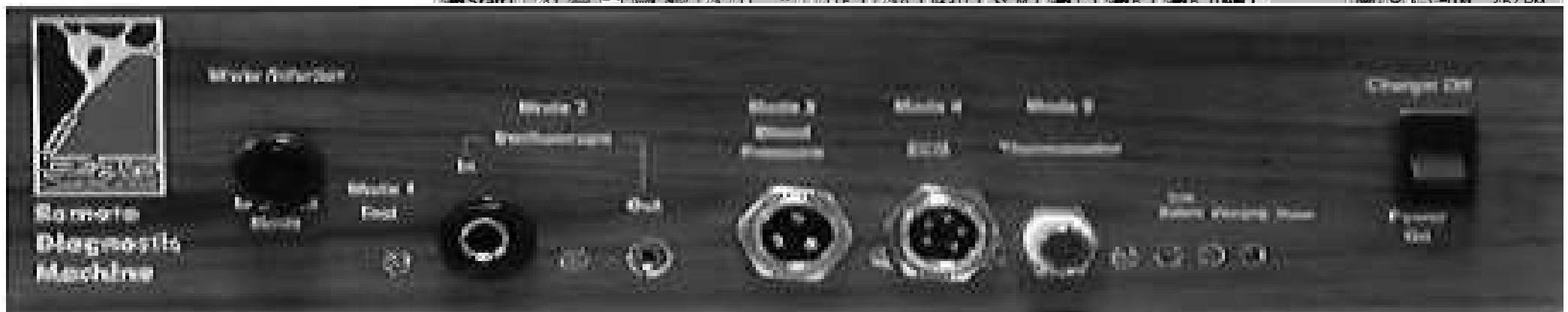
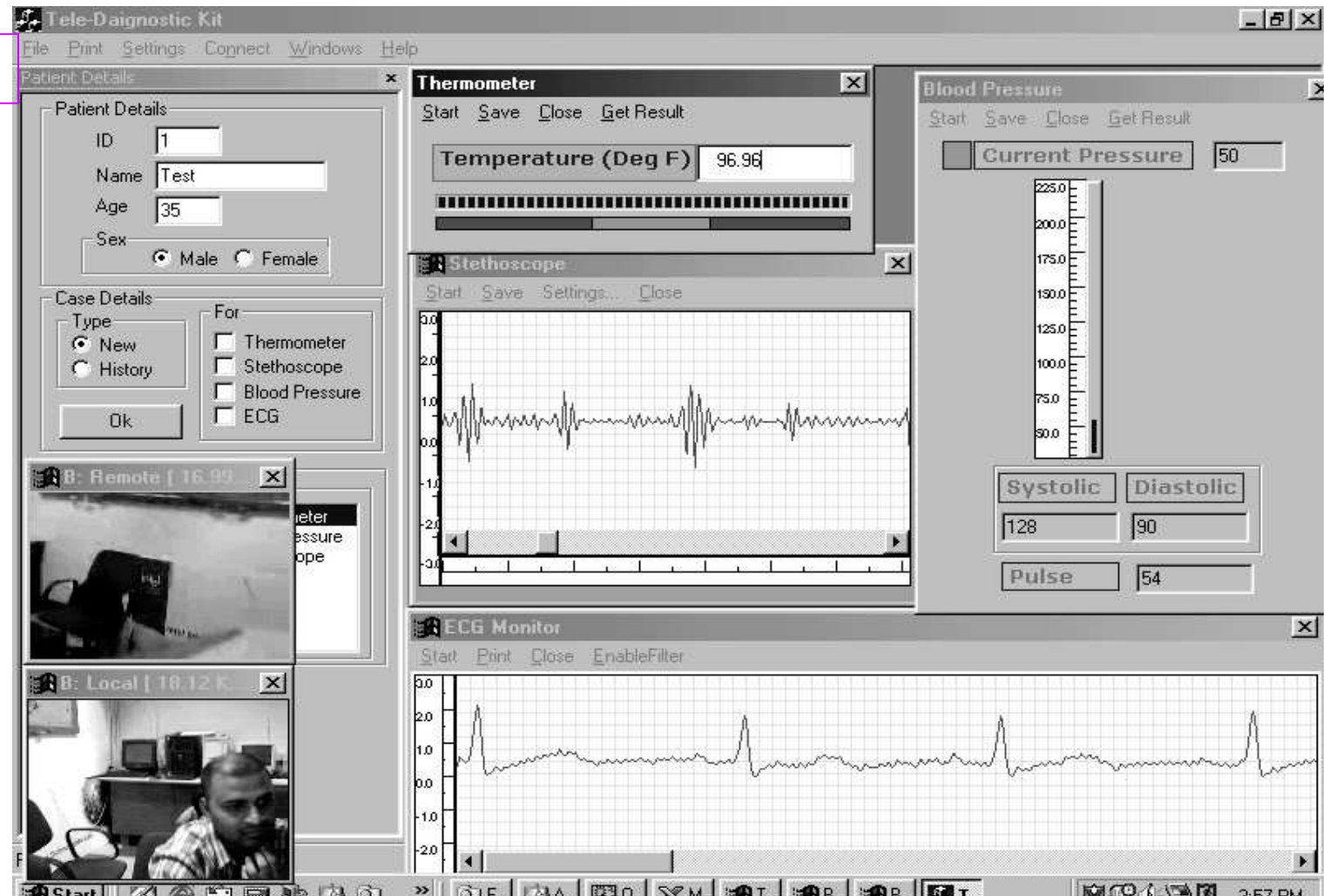
elona



## IITM - NeuroSynaptic

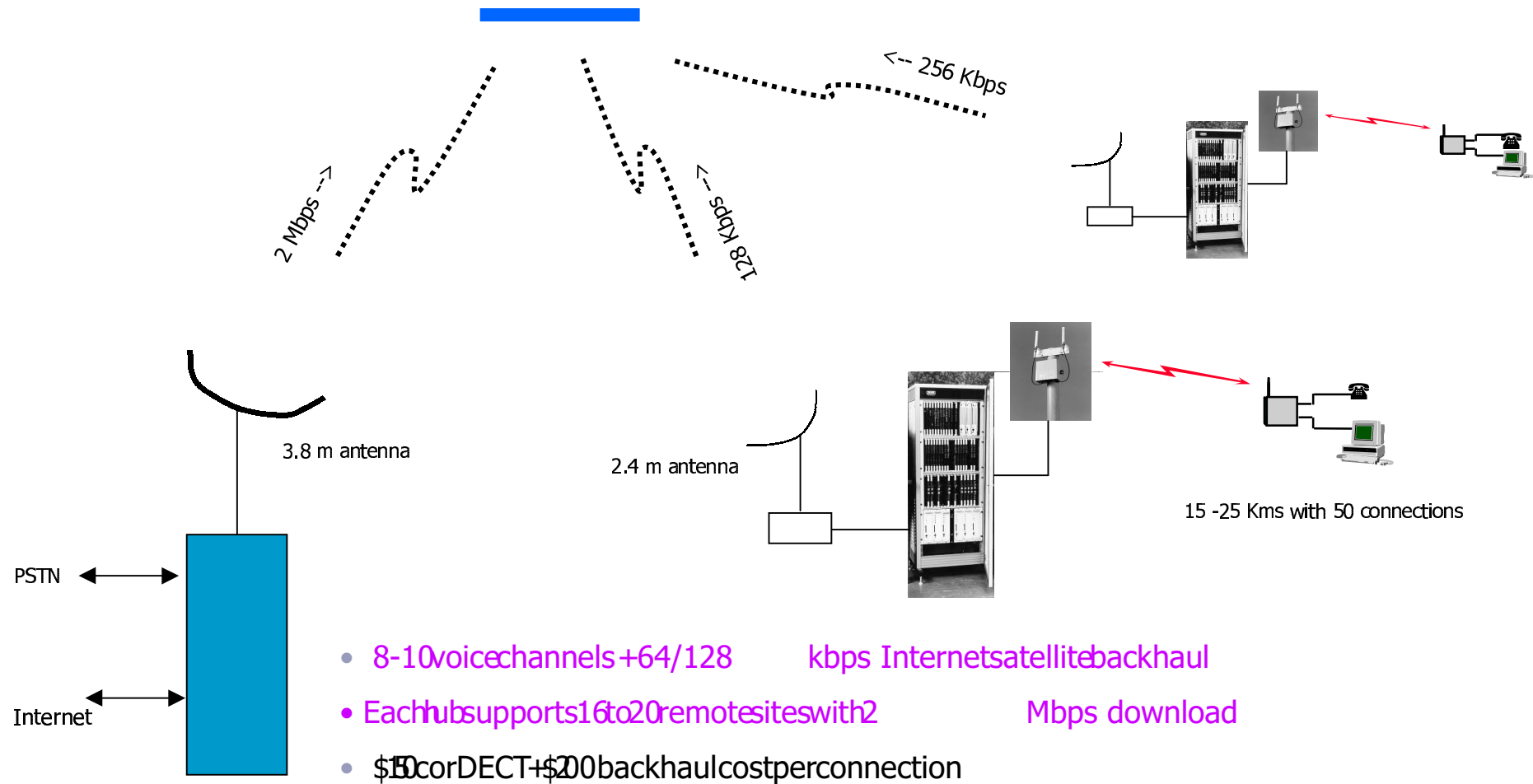
# Remote Monitoring of patient's health using wireless

A kit consisting of BP, Temperature, ECG measurement and Stethoscope for \$ 200



# Sparse Area Communications

where there is no fibre backbone

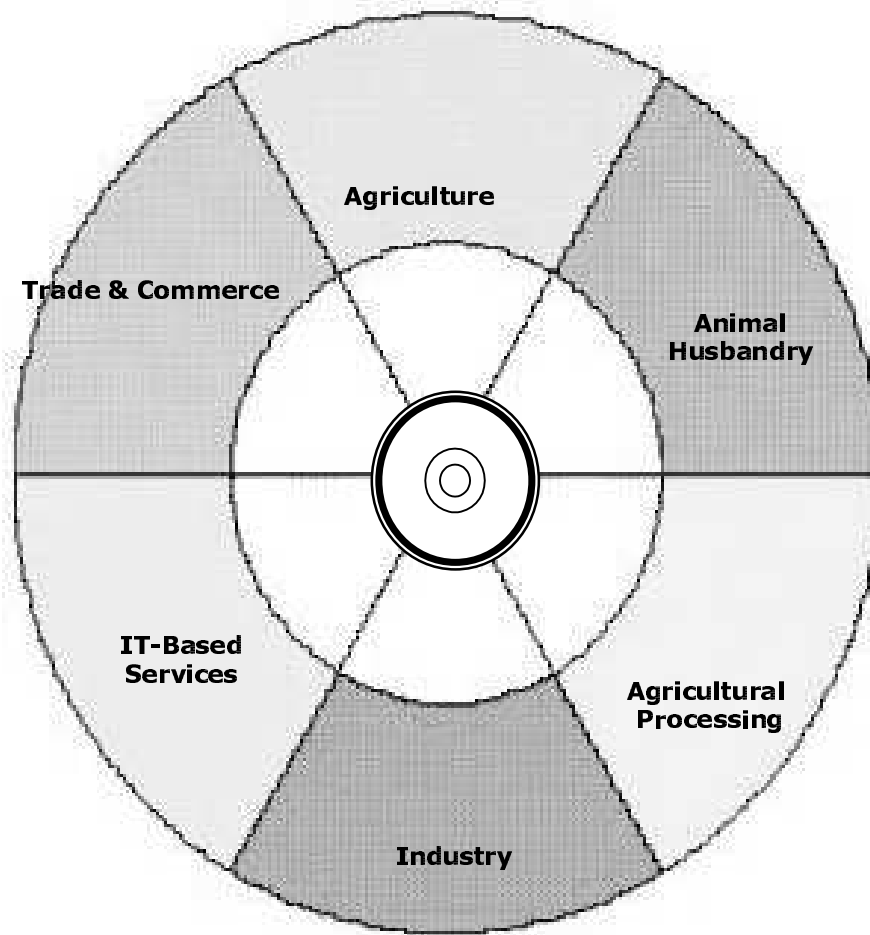


# Going forward

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- Rural kiosks can become communication hub for the village
  - multi-subscriber unit to provide several wired connection to village
  - kiosk can have micro-base station for GSM
  - thin clients in village homes with Wi-fi connectivity to a server in the kiosk
  
- can kiosk act as a power hub for the village?
  - Education hub
  - health center
  - Business Support Center

# Rural Micro-Enterprises are the Wealth Creators



- Micro-enterprises need
  - Finance
  - Knowledge and Training
  - Buying & Selling
  - Insurance
  
- Can Communications Enable these ?

# The Dream

Current Rural GDP in India = \$ 150 Billion  
For a Population = 700 million people  
**GDP / Person = \$ 200 per year**

**Rural Prosperity**



**DOUBLING per-capita Rural GDP**



**\$400 per person per year**



# Is this **replicable** in other developing economies?

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- Replicable
  - Business as drivers for connectivity
  - aggregation of demand where incomes are low
  - technology designed for specific condition can help
  
- not necessarily replicable
  - specific technologies and business models

# To Sum Up

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- ▣ Technologies can impact lives provided there is a big enough **Vision** behind it



TeNet Group, IITM

## ■ Dream of Doubling per capita Rural GDP

- Finance, Commerce, Training & Information are key
  - Driving Education, Health and Entrepreneurship is the means
- Large number of innovative technologies and applications need to be developed catering specifically to Rural areas