

Connectivity:

Technologies, Economics & Policy

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Ashok jhunjhunwala, IITM
& Ajai Chowdhry, HCL

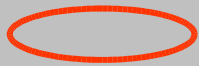
Convenor, Task Force on Connectivity and Space Applications

Rural India has 700 million people

- ◆ in 600,000+ villages
(about 1000 people per village with per-capita income of Rs 20 per day)
 - ◆ per capita GDP of Rs 10000 per year



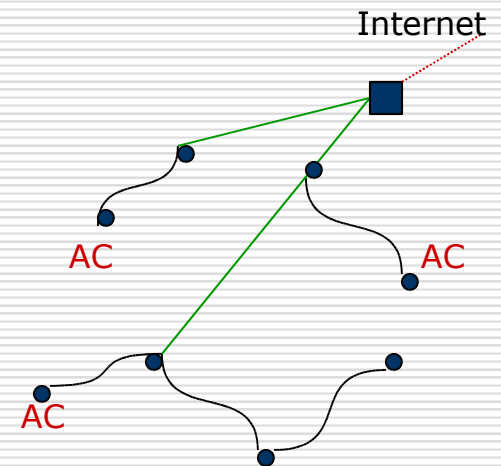
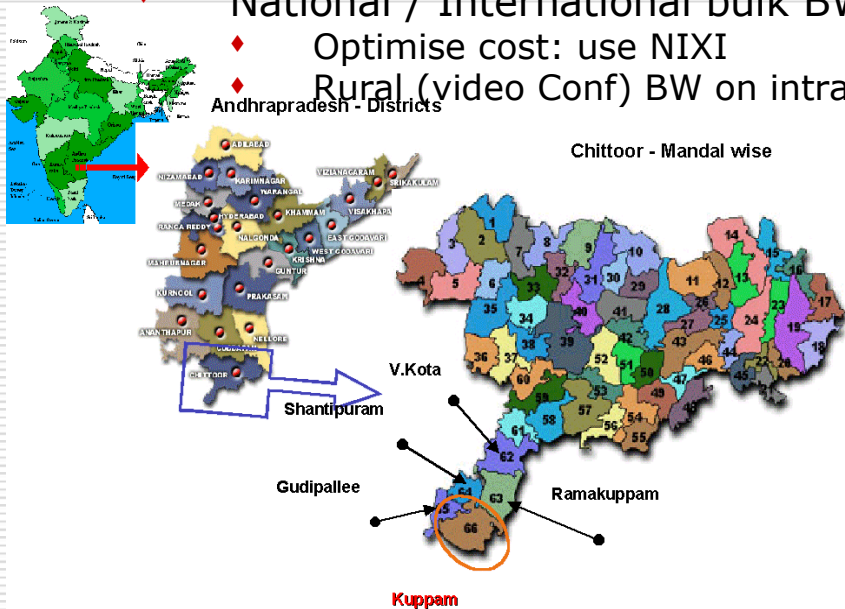
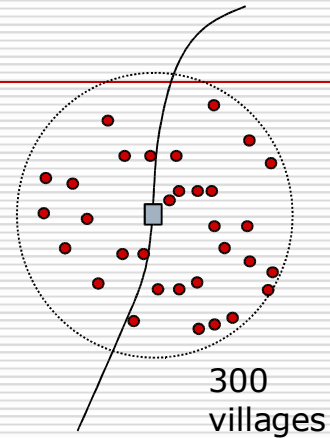
135 million rural households



- ◆ 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
 - ◆ Technology
 - ◆ Sustainable Business Model
 - ◆ Organisation which thinks and acts Rural

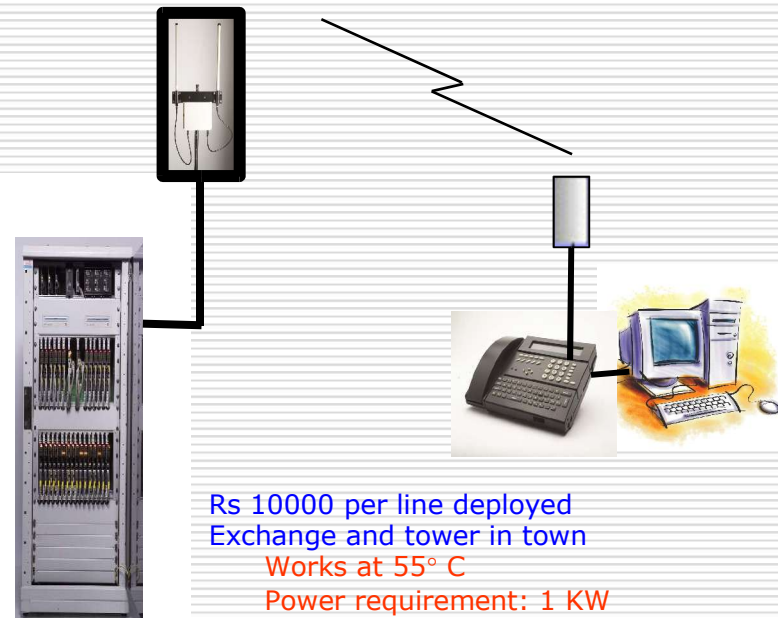
Backbone Connectivity

- ◆ BSNL has Fibre to every taluq hq
 - ◆ But Expensive: Rs 2 lakhs for 64 kbps link and Internet BW
- ◆ Fortunately Tata, Relaince, Bharati, Railtel, others also have some fibre links
- ◆ Access Center (serving 300 villages) need 512 kbps/ 2 Mbps connectivity
 - ◆ Lease 2 Mbps to make a Rural backbone network (Intranet)
 - ◆ National / International bulk BW at City
 - ◆ Optimise cost: use NIXI
 - ◆ Rural (video Conf) BW on intra-net, Cache servers



New Wireless Access Technologies for villages

- ◆ **BB corDECT**: 256/512 kbps dedicated to each village
 - 10 bps per Hz per cell: **fixed LoS**
- ◆ **HDR/ HSDPA** promising 100 plus kbps to each village
 - 1.8 bps per Hz per cell: **mobile**
- ◆ **WiMax** tech may give 500 kbps to each village: **mid 2007**
 - 4 bps per Hz per cell: **mobile**
 - 802.11D is only 1.8 bps/Hz/cell: **not good**
- ◆ **Flash-OFDM & iBurst**: 512 kbps
 - 4 bps per Hz per cell: **mobile**
- ◆ **Let market make access technology choice**
 - **Not a mandate of Mission2007**



Rs 10000 per line deployed
Exchange and tower in town
Works at 55° C
Power requirement: 1 KW

Wireless Access (from Taluka hq to each village: other costs)

- ◆ **LOS Tower cost:** Rs 12 lakhs
 - ◆ To enable low cost mast at each village
 - ◆ Non LOS tech like WiMax tech may reduce it to Rs 7 lakhs

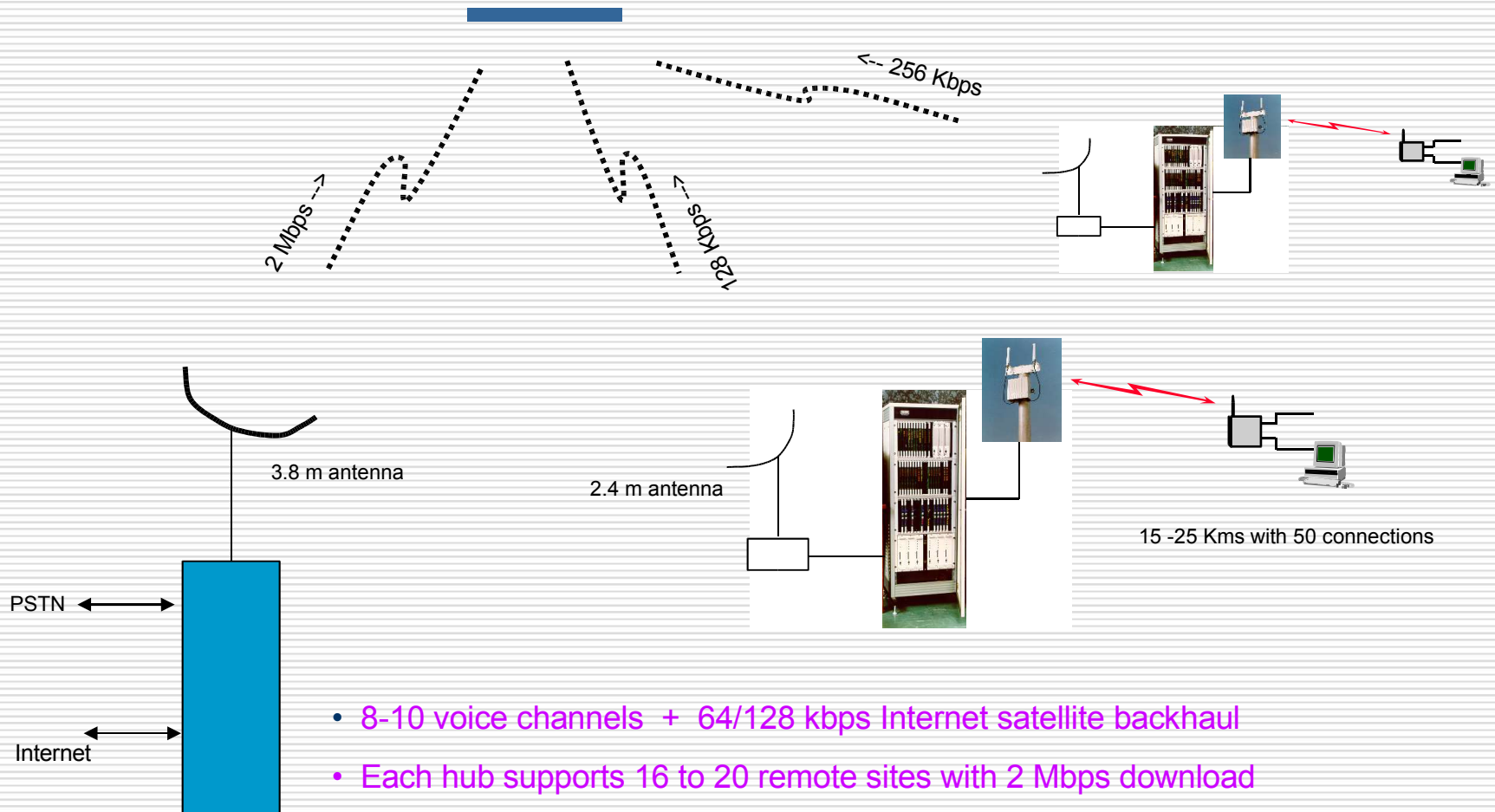
- ◆ **Spectrum costs**
 - ◆ BB corDECT spectrum (Rs 5 lakh per year), HSDPA/HDR would cost 2% of revenue, WiMax spectrum costs not yet specified

 - ◆ WiFi / 802.11b : 22 MHz or even more **Spectrum declared free**
 - ◆ 0.25 bits per second per Hz or less, inefficient but free
 - ◆ Radio costs as low as DECT / GSM:LOS technology – link budget only slightly worse than that of corDECT
 - ◆ But can we change the MAC : slotted and Can get **150-200 kbps /village** and peak rate of 2 Mbps

 - ◆ Center for Excellence in Wireless Technology (CeWiT) have taken an initiative to define **802.11 Rural MAC**

Sparse Area Communications

where there is no fibre backbone



Recommendations

- ◆ Open all Rural areas for Rural Service Provider for Rural connectivity (only in villages, not urban) at zero license fee for ten years
 - To provide any telecom / Internet / Radio Services using any technologies
 - Action: DOT (TRAI has already recommended) / Ministry of I&B

- ◆ Spectrum charges for all technologies free for rural service (or 2% of revenue share)
 - Action: TRAI / DOT

- ◆ Tower in Taluka and small towns and villages to be shared by all Service Provider on nominal lease for RSPs
 - Existing public connectivity available (like existing CIC) with Government to be shared with RSPs
 - Action: TRAI / DOT

- ◆ Build 2 Mbps plus Rural backbone to every taluka
 - TRAI has already reduced fibre leasing charges for such network by a factor of 4 enabling RSP to build their network
 - Make all SWAN networks complete and available (by June 2006) to any Rural Service Providers at some fixed charges
 - Make them Internet enabled
 - ◆ Action: All State Governments should connect to any RSP network

- ◆ E-governance services
 - Should be on Internet (web-enabled) and made available to all RSPs (not based on tenders)
 - Action: DIT / State Government

What does Connectivity give us? where are we?

- ◆ 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

4

Rating in
0 to 5 scale
based on
understanding

Infrastructure

- ◆ Rural backbone
 - ◆ India has fibre to most taluka headquarters
 - ◆ Lease BW on these fibre to make a Rural Backbone VPN
 - ◆ Add capacity as and when needed
 - ◆ Intra-rural communication remains on VPN
 - ◆ VPN connected to Internet at one or two points

- ◆ Broadband Accesses
 - ◆ 100 kbps plus Connectivity
 - ◆ For 400 villages in 30 km radius
 - ◆ 70% of India if villages over 500 considered
 - ◆ At Rs 10K per connection including towers

- ◆ PC + SW + Power (battery back-up or genset) + Accessories

3+

3+

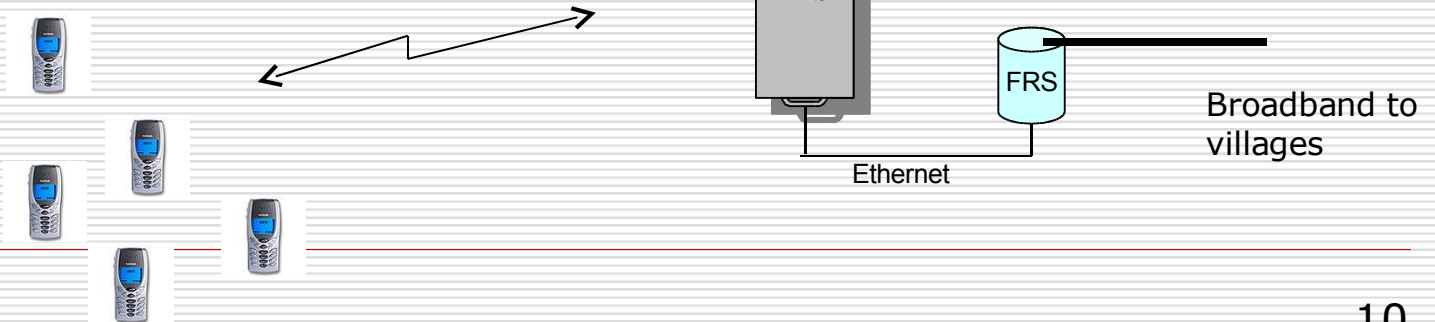
3+

Communication Services

- ◆ VoIP
 - ◆ Currently calls from India to outside
- ◆ GSM mobile
 - ◆ Use broadband access to connect a GSM Base Station in a village
 - ◆ Provide mobile service with unlimited calling within district at Rs 100 pm
 - ◆ 100 phone per village
 - ◆ Regulatory issues

3

2+



Distributed Production In Rural India: Crafts & Micro-franchise

Current Status: 7 villages, 5 to 10 women in
each village

1+

Distributed Production enabled by Internet

- ◆ Embroidery for Life
 - ◆ Women embroiderers trained by designer entrepreneur in villages
 - ◆ An emerging business model for entrepreneur and kiosk operator
- ◆ Bags for Life
 - ◆ Training in handmade paper bag, organizing production, quality control
 - ◆ Quality products for the domestic and export market





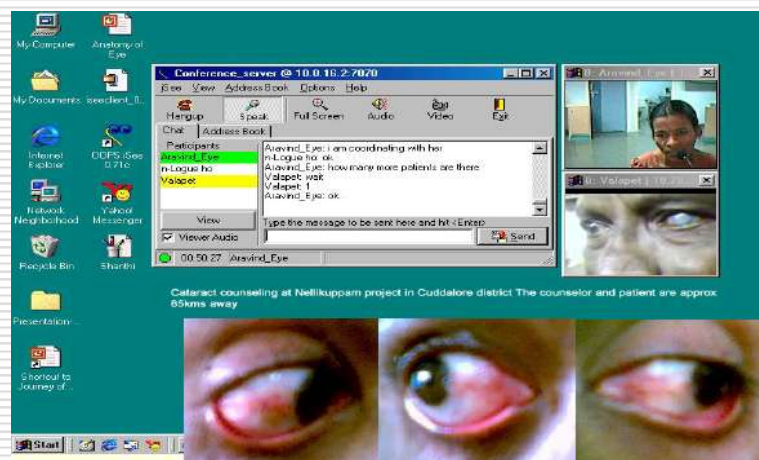
IT enabled Services

Current Status: 35 villages

2+

Job work performed at the kiosk





Remote Eye Care with Aravind Hospitals



Vet care with Veterinary college



Telemedicine

2+

Started with video based eye care, contacting doctor and Vet doctor

ReMeDi™ Tele-medicine solution

A screenshot of the 'Tele Diagnostic Kit-Version 0.9' software interface. The window title is 'Tele Diagnostic Kit-Version 0.9' and it has a menu bar with 'Settings', 'Connect', 'Record', 'Help', 'Tools', and 'Audio'. The interface is divided into several panels:

- Patient Details:** Fields for ID (2), First Name (Rajan), Last Name (M), Age (24), and Sex (Male). Buttons for 'Send' and 'Create' are present.
- Measurements:** A table with columns 'Case ID' and 'For'. Case ID 1 is listed.
- Stethoscope:** A control panel with a 'Close' button.
- Blood Pressure:** A vertical scale from 50.0 to 225.0. 'Current Pressure' is shown. Readings: Systolic 101, Diastolic 76, Pulse 96. Buttons for 'Start', 'Stop', and 'Close' are present for each measurement.
- ElectroCardioGram:** A graph showing a red ECG trace. 'LEAD I' is selected. 'Print', 'Close', and 'EnableFilter' buttons are visible. Scale: 'Vert 0.1mm/mV, Horz 25mm/Sec'.
- Control:** A panel with buttons for 'Start', 'Stop', and 'Close' for Stethoscope, Blood Pressure, Electrocardiogram, and Thermometer. It also has 'Delegate', 'Grabback', and 'Get Result' buttons.
- Temperature (Deg F):** A panel showing a reading of 97.6 with a color-coded bar below it.
- symptoms:** A panel with tabs for 'Symptoms', 'Diagnosis', and 'Prescription'. A 'Send' button is at the bottom.
- Video Feeds:** Two video windows. The left one is labeled 'B: Doctor | 49.38 Kbps / 4.41 fps' and shows a man in a white shirt. The right one is labeled 'B: Patient | 51.29 Kbps / 3.43 fps' and shows a man in a plaid shirt.

The Windows taskbar at the bottom shows the Start button, system tray icons, and the time 6:27 PM.

Financial Services

2-

- ◆ Can kiosks be mini-banks?
 - ◆ Can they facilitate agricultural loans?
 - ◆ Can money transfer from cities/ urban areas be facilitated?
- ◆ Can kiosks facilitate micro-finance?
 - ◆ Can the interest rate be significantly brought down?
- ◆ Can kiosks carry out credit-rating of rural people?
- ◆ What about Insurance?

Vortex GramaTeller initiative with ICICI, reducing the cost of ATM to 1/15th



Micro-weather prediction

- ◆ Collect weather data at each village
 - ◆ Temperature, humidity, pressure, wind speed, wind direction and rainfall
 - ◆ Can one use micro-weather prediction systems?
 - ◆ Use village data for weather insurance
- ◆ TeNeT & Neurosynaptic develops
 - ◆ Weather Monitoring Kit : Rs 10,000
 - ◆ Remote Measurement of each of these parameters at each village multiple times a day and recoding at some central server
 - ◆ Prototype ready



Huge potential Impact on crop insurance, micro weather models, prediction, disaster management

As kiosks want a second computer

- ◆ Introducing NetPC (Multimedia Network PC)
 - ◆ Connected to a PC Server on LAN
 - ◆ No virus, no back-up required
 - ◆ Target price: Rs 3500 plus monitor



Services Status

- ◆ Infrastructure 3+
 - ◆ Capacity Building 2+
 - ◆ End to End Services using ICT
 - ◆ Basic Services (email, browsing, games, DTP, astrology, matrimonial, photography) 4
 - ◆ Communication Services (VoIP, Mobile) 3
 - ◆ Education 3+
 - ◆ Micro-franchise 1+
 - ◆ ITeS 2+
 - ◆ Telemedicine 2+
 - ◆ Agriculture 2-
 - ◆ Financial Services 2-
 - ◆ Jobs 0
 - ◆ Buying and Selling 1-
 - ◆ E-governance 1+
 - ◆ Micro-enterprise 0+
 - ◆ Online Games 0
- ◆ How do we drive each of these to 4+ in the next two years?
 - ◆ How many companies does each require?
 - ◆ What about community oriented services?