Connecting the Last Mile at Rajaborari: Emergence of Smart Villages

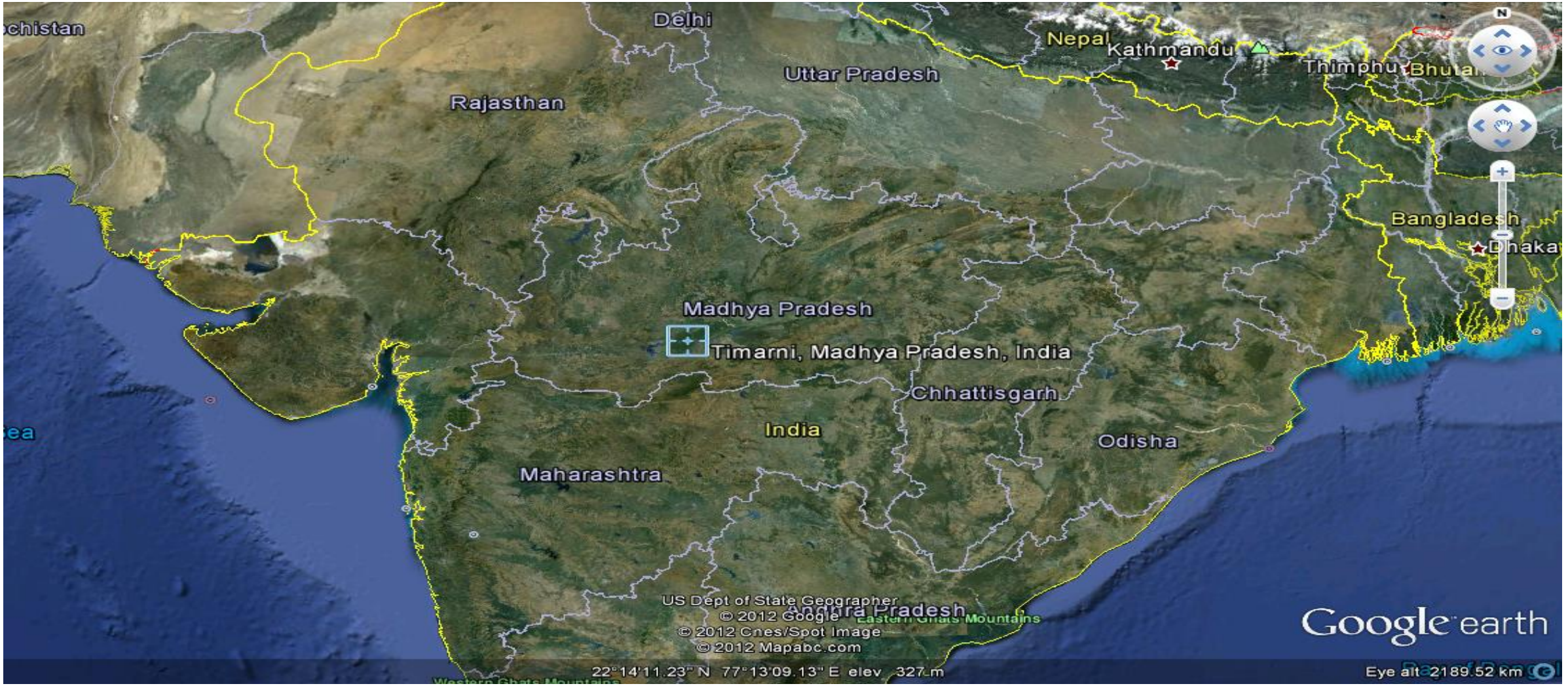
Dayalbagh Adivasi Education
(Academic-Vocational-Entrepreneurial)

Key objectives

- **Proving digital Infrastructure as a Utility to Every Citizen**
  - Extending backbone network to deep tribal areas (in this case it is 50 Km from nearest urban locality)
  - Providing last person connectivity to citizens in one of the most rural and remote areas of the country.
  - Integration with National Optical Fiber Network and possibly with National Knowledge Network for education purposes
- **Digital Empowerment of Citizens**
  - Provide digital literacy
  - eEducation and eHealthcare
  - Extension of technology enabled services from Dayalbagh, to serve as a scalable model for the rest of the nation.
  - Facilitate e-governance and a number of welfare schemes
  - Promote e-commerce and boost entrepreneurship.

Location

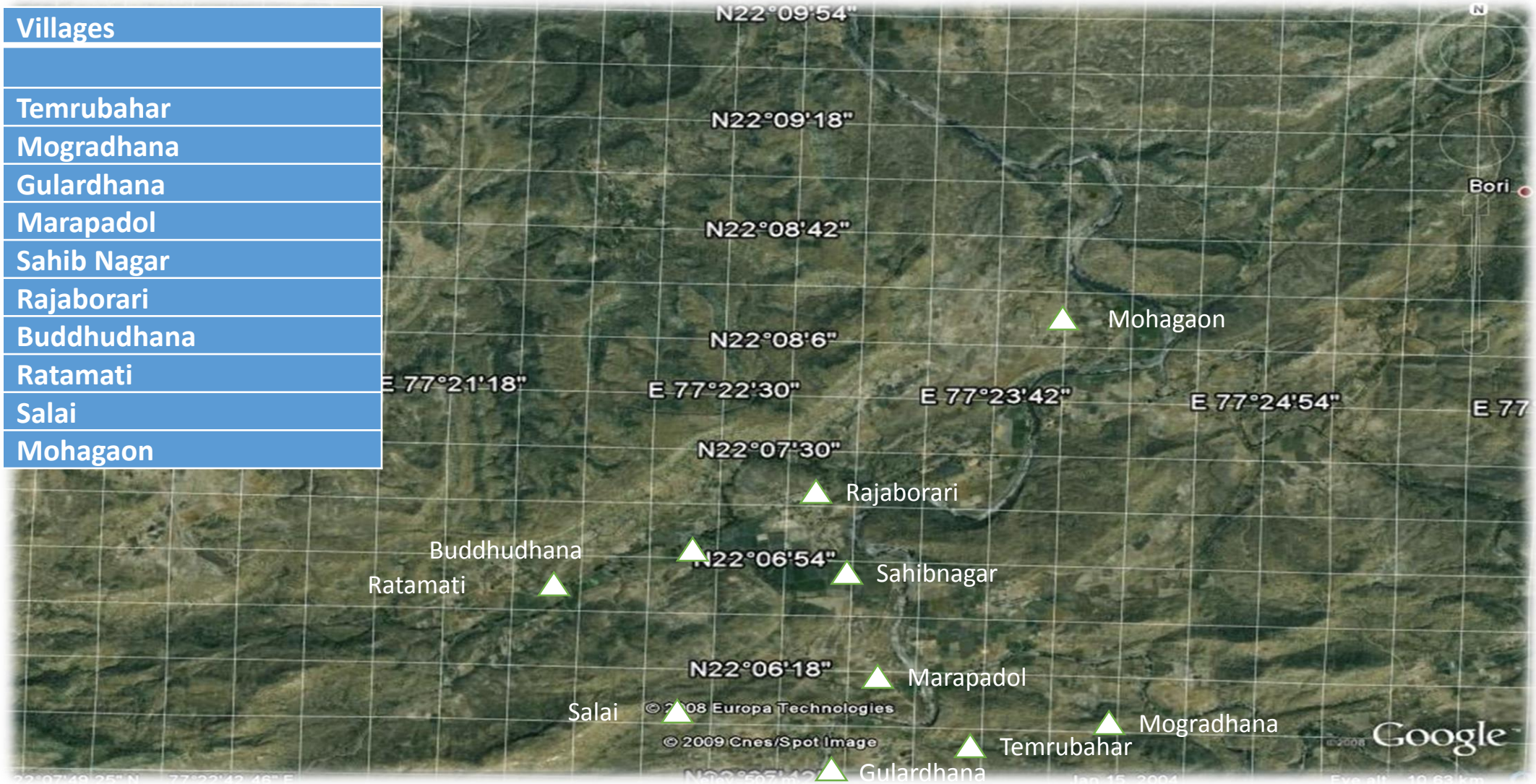
The Rajaborari Estate is a cluster of 10 villages nestled in dense bamboo and teak forests in the hilly terrain of Harda district in Madhya Pradesh.



Location

Google Map of the Villages of Rajaborari

Villages
Temrubahar
Mogradhana
Gulardhana
Marapadol
Sahib Nagar
Rajaborari
Buddhudhana
Ratamati
Salai
Mohagaon



Implementation Challenges

- First challenge was the 50Km wireless link from Timarni to Mahagaon in 5GHz band with good bandwidth. Hilly Terrain with dense vegetation makes it difficult for line of sight wireless communication.
- The second challenge was transmitting the E1 signal of GSM from Timarni BSNL exchange to Rajaborari Tower for BTS Connectivity over wireless network consisting of two hops (Timarni to Mahagaon 50Km and then Mahagaon to Rajaborari Tower 2.3Km). Telecom Sector was sceptical about the success of this project. As this requires low latency of <10ms upto BTS.
- Electricity is available in all villages but is extremely unreliable with long power cuts.

Wireless Back Haul Network, Internet Services and Mobile Telecommunication Services in Tribal Villages of Rajaborari Estate

- Though communication facility was long awaited in Rajaborari Estate because of difficult terrain, high cost involved in fibre optic cable laying and expecting very low revenues from these sites no service provider came forward.
- Dayalbagh took up this task of putting in place the communication facility in this cluster of tribal villages.
- A High Speed Wireless Backhaul Network from Timarni to Rajaborari Villages was set up with the first link established in 2009.
- Dayalbagh partnered with BSNL for Providing Telecom Services
- High Speed Wireless Link, Solar power plants, required protocol conversions, to some extent even BTS installation were handled by DEI team.
- Dayalbagh has also provided towers, wireless links, space and power at free of cost to BSNL.

Wireless Back Haul Network, Internet Services and Mobile Telecommunication Services in Tribal Villages of Rajaborari Estate

OBJECTIVES MET

1. Cost effective, and sustainable Infrastructure and access technology.
2. Internet Connectivity and ICT based services.
3. Telecom services to the remote rural parts.
4. State-of-the-art facilities for Quality Distance Education with E-classrooms equipped with two way Video conferencing systems for synchronous delivery of classes.

Wireless Backhaul for Internet Connectivity (for ICT Services) and Mobile Telecom Services

Timarni
BSNL Exchange
tower

40 km

2.3 Km

2.7 Km

Mahagaon School
Wifi Mast 140 ft

Rajaborari DEI ICT Center
Rooftop Wifi Mast 50Ft

Rajaborari
WiFi Mast + BTS

5.5 Km

All the radio links, E1 converters , N/W switches and BTSes (BSNL) are powered by Solar Power

1.8km

2.5Km

Mogradhana School
Wifi Rooftop Pole

Salai school
Wifi Tower 90 ft

Gulardhana School
WiFi Tower 70 ft + BTS

Coverage of Telecom Services

The coverage now includes the following villages:

1. Rajaborari
2. Mahagaon
3. Sahab Nagar
4. Marapodol
5. Salai
6. Mogradhana
7. Temrubahar
8. Gulardhana
9. Ratamati
10. Buddhudhana
11. Chandiapura
12. Kumroom
13. Kayda
14. Unchaborari
15. Chandrakhal
16. Bori
17. Khode Bode

Total Population being covered
8000

Total Number of Users
2500

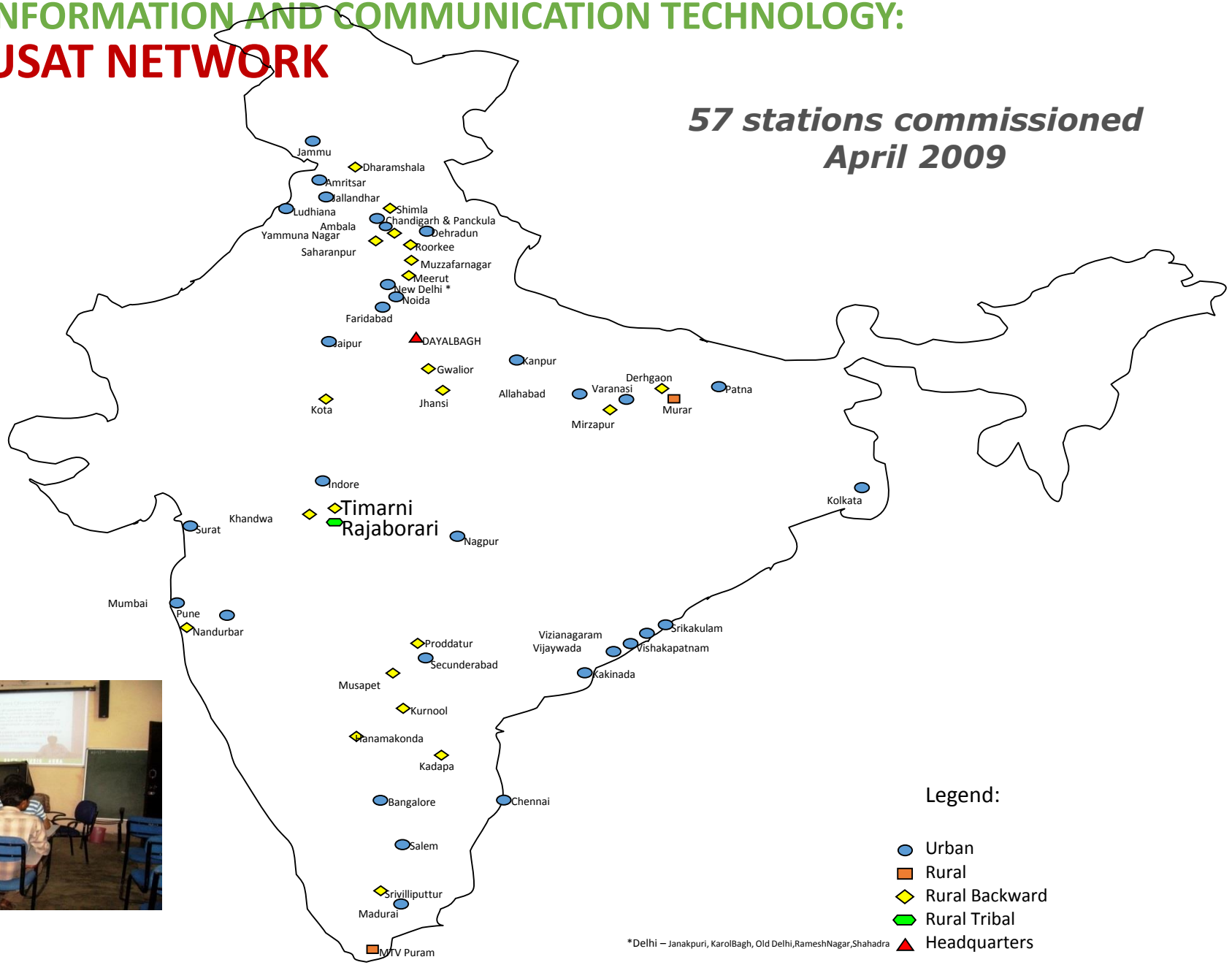
Monthly Mobile Recharge
Rs 1,00,000

Number of new SIMs
60-100 per month

Villagers using Mobile Telecom Services

Backhaul Links

HARNESSING INFORMATION AND COMMUNICATION TECHNOLOGY:
THE DEI EDUSAT NETWORK



Edusat at Rajaborari

Edusat E-classrooms at
DEI ICT Centre

Edusat Antenna

Infrastructure

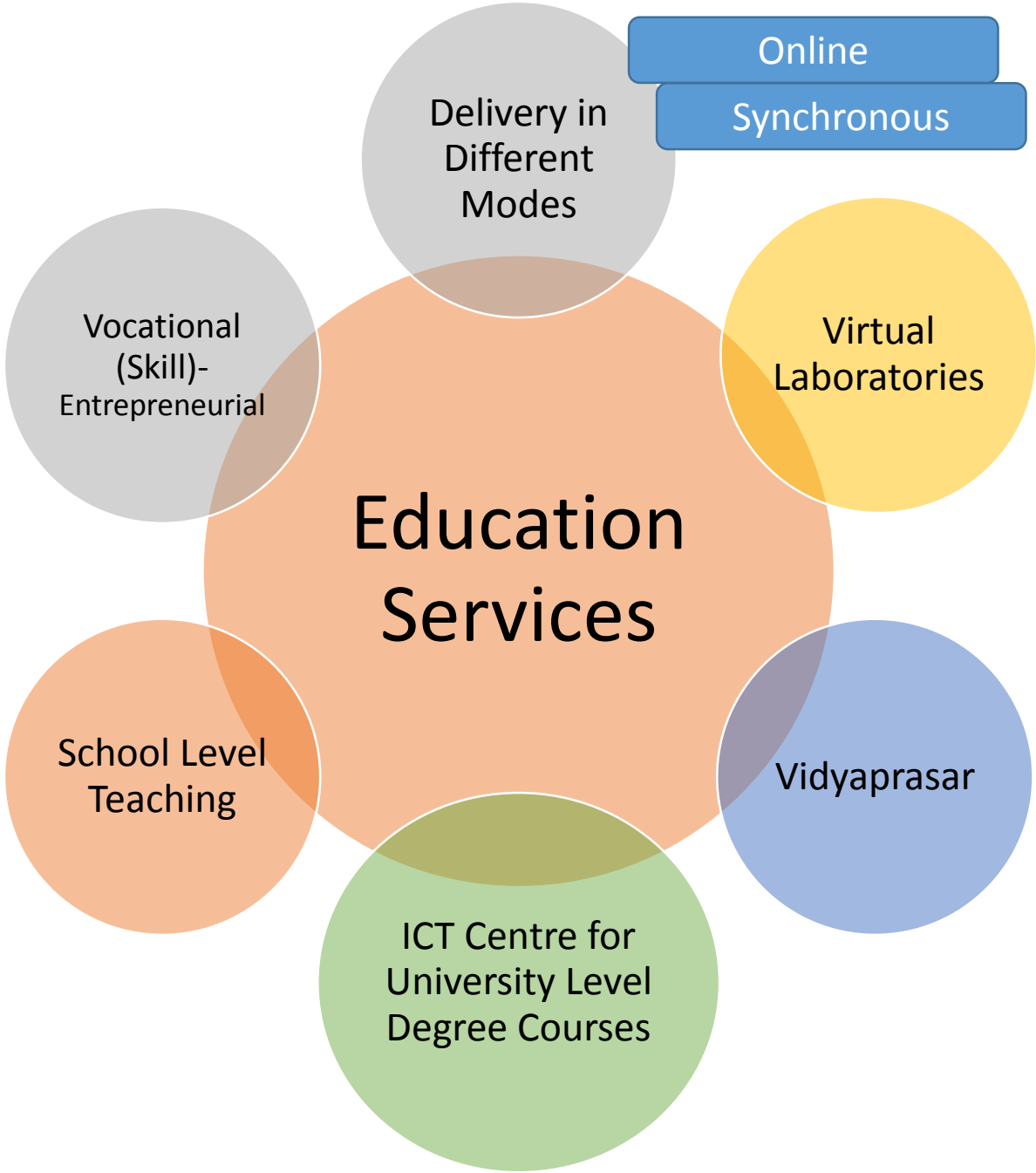
E-classrooms at
DEI ICT Centre

WiFi and Internet services at
1.Rajaborai School
2.Salai School
3.Mahagaon School
4.Gulardhana School
5.Mogradhana School

Empowering Tribal women through ICT

Infrastructure

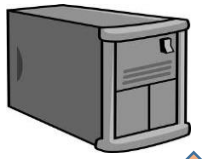
- Computer Cells with latest equipment
- Wifi connectivity in the entire school


Online
Synchronous
Delivery in Different Modes
Vocational (Skill)- Entrepreneurial
Virtual Laboratories
Education Services
School Level Teaching
Vidyaprasar
ICT Centre for University Level Degree Courses

Content Delivery Modes

- Traditional classroom mode
- Blended mode
- Fully-synchronous mode
- Semi-online mode
- Online DEI (e-DEI-de)

Delivery Infrastructure

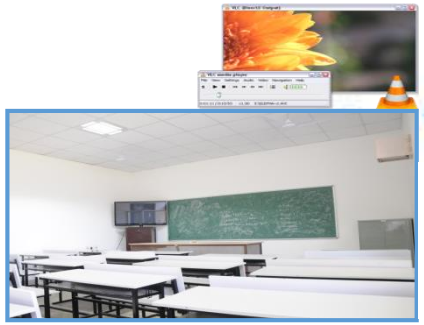


Streaming Servers

EDUSAT

Internet

Receiving Centre



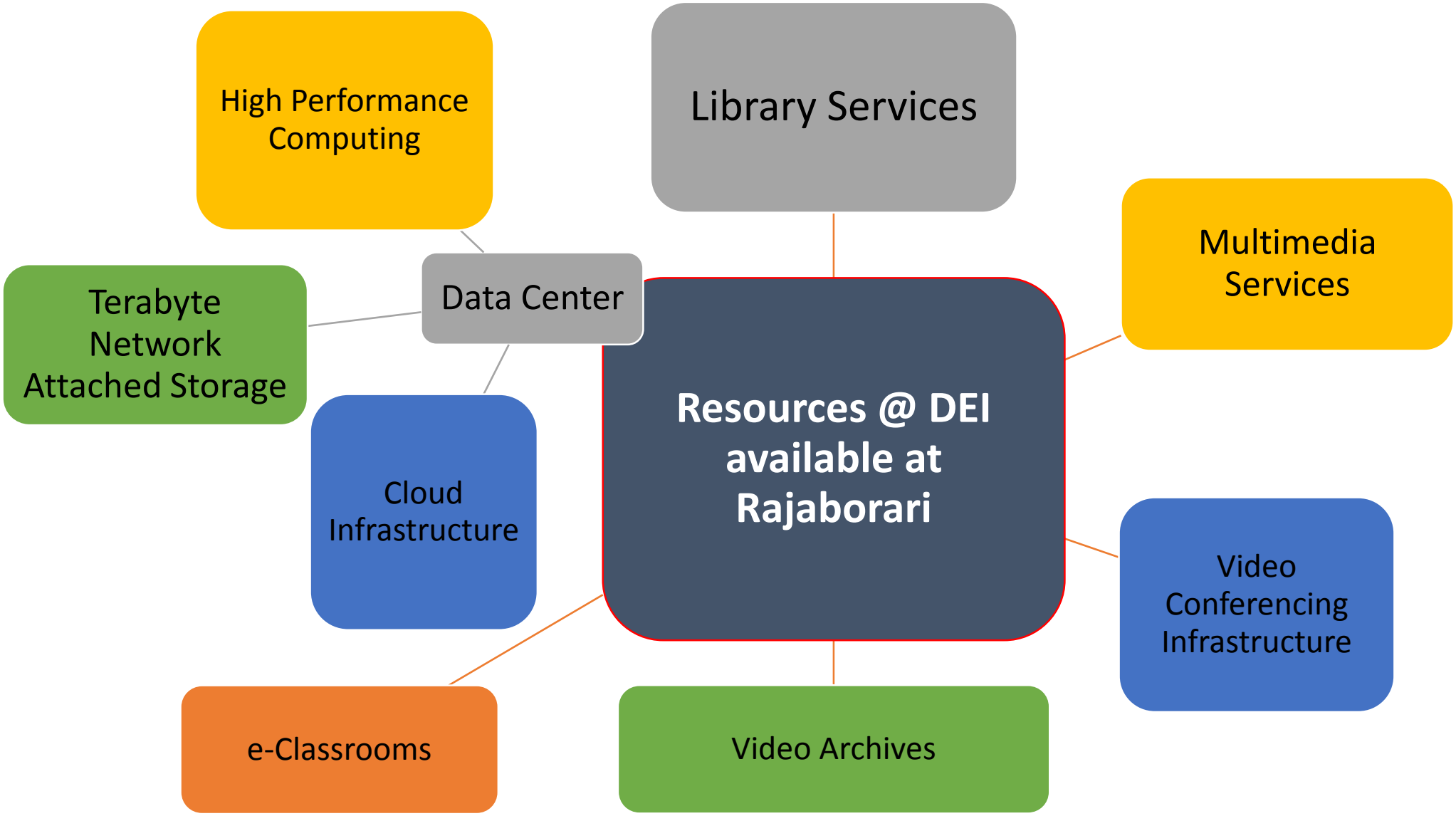
IGNOU

DEI

Polycom Live Delivery Infrastructure

Capturing Systems

ICT Centre Delhi


High Performance Computing
Library Services
Multimedia Services
Terabyte Network Attached Storage
Data Center
Resources @ DEI available at Rajaborari
Cloud Infrastructure
Video Conferencing Infrastructure
e-Classrooms
Video Archives

eLearning Initiative in Primary and Secondary Education

- Implement a System with
  - A Complete Interactive Classroom experience
  - A Pedagogy that comprises of a Technology Assisted platform for providing self-paced and unsupervised learning.
    - Intuitive and interactive – involve local examples
    - Self- assessment exercises
    - Integrate text, audio and video
  - Collaborations and peer group consultation
  - Mentoring
  - Easy to use interfaces
  - Access using mobile devices/ Web

eConsultation System for Health Care

- Implementing an integrated system with the following features:
  1. Offline, mediated consultation through a Web & Tablet based module.
  2. Online consultation using existing multiparty video conferencing infrastructure at Dayalbagh. (Available since 2009)
  3. Consultation and collaboration between different doctors
     - Doctors identified manually/ based on initial diagnosis
  4. Suggest conservative treatment based on diagnosis
     - Combining local knowledge
  5. Integrate e-Education for Health
     - Cover local diseases, local lifestyle, wrong habits and case studies

Telemedicine

- Regular Telemedicine sessions are held with Timarni and Rajaborari since 2009.

Hole in the Wall

- “Hole in the Wall Experiment” is also conducted, with the objective of promoting computer literacy among tribal children.
- Village children are given free access to use Laptops/ Computers and are allowed to learn on their own with minimal guidance.
- The program has become highly popular with village children who eagerly look forward to these sessions.