STUDY

TATA-MIT Education Initiative

Aizawl District (Mizoram) School Technical I nfrastructure & Connectivity Feasibility Study

Shahid Ahmad & Rucha Deshpande
Digital Empowerment Foundation
25-Nov-14

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Executive Summary

The **TATA Trust** and **MIT University, USA** are collaborating to develop an educational program for high schools and B.Ed. colleges in three states of India using modern educational technology and Information and Communication Technology (ICT). The TATA-MIT team plans to implement a scaled proof of concept in the following states: Rajasthan, Chhattisgarh and Mizoram.
Towards the project initiative and in order to understand the situation on the field with respect to technical infrastructure and connectivity status in high schools and B.Ed. colleges, the TATA-MIT commissioned a **Feasibility Study in Aizawl district in the state of Mizoram** to assess the connectivity and related infrastructure situation.
The following report summarizes the:

- Background of the study
- Survey and study methodology
- Key findings
- Broad recommendations
- Business Plan Recommendations

The Feasibility Study was conducted in September, 2014 by **Digital Empowerment Foundation (DEF).**

Objectives and Methodology

Broad objectives of the study were to assess high schools, higher secondary schools and the B.Ed. College in Aizawl district based on:

- the current and required infrastructure and hardware requirements with focus on connectivity, access, power, technical support and HR status in and around the schools and B.Ed. college;
- availability, feasibility and sustainability of high-speed Internet connectivity implementation; and
- readiness of school/college staff, support staff and students.

School principals and teachers, IT Trainers and Experts, Technical Support staff, citizens and Government officials were interviewed via a comprehensive Android tablet-based questionnaire. A total of 66 schools were surveyed including Government high schools and higher secondary schools, private, Adhoc Aided and RMSA High schools.

The school staff was mainly questioned about Internet connectivity in schools and home, power supply, usage of computers and other devices in school and home and the challenges encountered while incorporating usage of technology in education. The overall digital literacy of school staff, students and principal was also assessed. In the areas near all schools, citizens were randomly interviewed to know about Internet and computer usage at homes and openness of adopting technology for their children's education.

Computer training institutes were also visited to find out if they offer courses for schools, their willingness and capacity to design such an offer and more details about their training

programs. Support personnel were also asked if they provide technical support to schools or not.

Internet Service Providers like BSNL were mainly consulted to understand about poor Internet connectivity in Aizawl district region and ways to improve the same.

For the purpose of network planning, the latitude and longitude of each school was collected using Android-based GPS-driven application 'Maverick'. Based on this information, the network planning was performed using Google Earth and PTP Link Planner software.

Key Findings

The overall survey findings indicate that more than 50% schools do not have any kind of Internet facility. The ones in which Internet is available is slow, intermittent and having incompetent technical support. The Internet is mainly provided by BSNL while some schools use the 3G dongle by Airtel and other private ISPs. Another shocking finding was that more than 90 % of the rural schools did not have Internet connectivity as service providers do not wish to invest in infrastructure in regions of low return on investment (ROI).

In terms of computer and related infrastructure, schools fared very differently. Almost all schools had computer labs with equipment provided by State Council of Educational Research and Training (SCERT). However, the proper use of the equipment was not known to most teachers, leading to misuse or wasteful use of the devices. Around 40 % computers in all schools were not operational, damaged, dumped or unused. However, the positive aspect is that most schools have enough space to setup computer labs with sufficient number of computers to serve all student population.

Another striking finding was that most school staff was using computers and mobile phones for either administrative tasks like typing and printing or for entertainment purposes like using Facebook and playing games. A few challenges were identified behind this trend. Most of the teachers were interested in using computers but did not have sufficient training. As per their information, the Government did not provide enough and updated training for teachers to effectively use technology in education. Lack of interest and awareness was also found to be of major concern, especially in schools of rural areas.

A few other secondary findings were made related to power supply in schools. It was found to be mostly satisfactory except the expected downtime during rainy season. However, usage of generators and UPS would solve those problems. Another point to note would be the lack of technical support services near few urban and all rural schools.

Broad Recommendations

Based on the survey findings briefly mentioned above, a few **recommendations** were made with respect to **training, infrastructure and network planning.**

1. **Training:** The TATA-MIT team would be developing content for three subjects during the first year of the project – mainly Maths, Science and English. Basic computer literacy training for at least the three subject teachers in all schools is recommended. In addition, the school principal should also receive basic digital literacy training and two additional teachers should be trained as technical support staff. The plan and budget for the training programs has also been provided in the report.

   For **training support**, training agencies like SCERT, local training centers, IT experts and external institutions can be approached for partnerships.

2. **Infrastructure:** In terms of school infrastructure, it is recommended to provide additional infrastructure in schools where Student-Computer ratio is not satisfactory and other
3. **Network planning:** To improve the situation of poor Internet connectivity in Aizawl region, High Speed Network connectivity plans with BSNL can be tapped into for improving access to schools which currently use BSNL Internet. Private Internet Service Providers can also be approached to setup Wireless Internet in schools where Internet is not available yet.

Community wireless network is seen as the best alternative for wireless-based access in Aizawl high schools. This will be modeled on a community owned not-for-profit venture that will run a wireless network and provide access to government schools and other community clients, generate resources and reinvest to sustain the network.

Business Plan Recommendations

To understand the feasibility of a low-cost Community Wireless Network, DEF conducted a comprehensive study of network feasibility to understand all its aspects like technical, economic, legal, operational and scheduling feasibility. Unlicensed band (free spectrum) of 2.4 GHz and 5.8 GHz can be used to provide low-cost Internet; although it works only in line-of-sight locations due to small wavelength.

Using the PTP Link Planner software and Google Earth, all target school locations were mapped and the best possible linkages were created to minimize the tower height and yet achieve the best possible connectivity.

Once the number of towers to be setup, additional hardware and software required for the same were finalized, the overall budget was also calculated. It included one-time cost and ongoing cost for services and maintenance.

Apart from the concise budget for network planning, the budgets for setting up training centers, training costs and additional infrastructure costs for schools have also been calculated and mentioned in the report.

The project one-time cost for the first year would be provided by TATA-MIT Team as per the business model suggested and the sustainability plan from Year 2 onwards has been shown in details in the report. The break-even will occur after 18 months of network operation and the Wireless Network would be able to sustain its monthly expenses and also earn profit.

To summarize, the feasibility study would successfully help the TATA-MIT Team understand the current situation in Aizawl district with respect to connectivity, infrastructure requirement, costing and teacher training and would also provide strong recommendations to bring high-speed network connectivity to this remote area and ensure teacher readiness to accept and deliver the contemporary education program which the TATA-MIT Team plan to develop.

1 TATA-MIT Feasibility Study Survey

About the TATA-MIT Education Initiative

The TATA Trust and MIT University, USA are collaborating to develop an educational program for high schools and B.Ed. colleges in three states of India using modern educational technology and Information and Communication Technology (ICT). The TATA-MIT Education Initiative aims at using contemporary educational technology to address the learning needs of students to better prepare them for active participation in higher learning and economic opportunity, to improve teacher education and transform their practice and to provide a platform for ongoing research and innovation in education that will inform the field.

The proposed initiative seeks to directly engage with and alter the current situation of high schools in India by providing alternatives that will swing the balance decisively towards quality. The aim is to provide valuable learning opportunities at scale, that are capable of changing what our students and teachers know and can do using technologies, not as pipelines for the delivery of content, but to provide pathways to authentic learning and communities.

The TATA-MIT team plans to implement a scaled proof of concept in the following states: Rajasthan, Chhattisgarh and Mizoram. Towards the project initiative and in order to understand the situation on the field with respect to technical infrastructure and connectivity status in high schools and B.Ed. colleges, the TATA-MIT commissioned a Feasibility Study in Aizawl district in the state of Mizoram to assess the connectivity and related infrastructure situation.

About the Feasibility Study Survey

The Feasibility Study was conducted in September, 2014 by Digital Empowerment Foundation (DEF) to understand the situation on the field with respect to technical infrastructure and connectivity status in high schools and B.Ed. college of Aizawl District.

Broad objectives of the study were to assess high schools, higher secondary schools and the B.Ed. College in Aizawl district based on:

- the current and required infrastructure and hardware requirements with focus on connectivity, access, power, technical support and HR status in and around the schools and B.Ed. college;
- availability, feasibility and sustainability of high-speed Internet connectivity implementation; and
- readiness of school/college staff, support staff and students.

Coverage of the Survey

The following categories of respondents were interviewed during the survey:

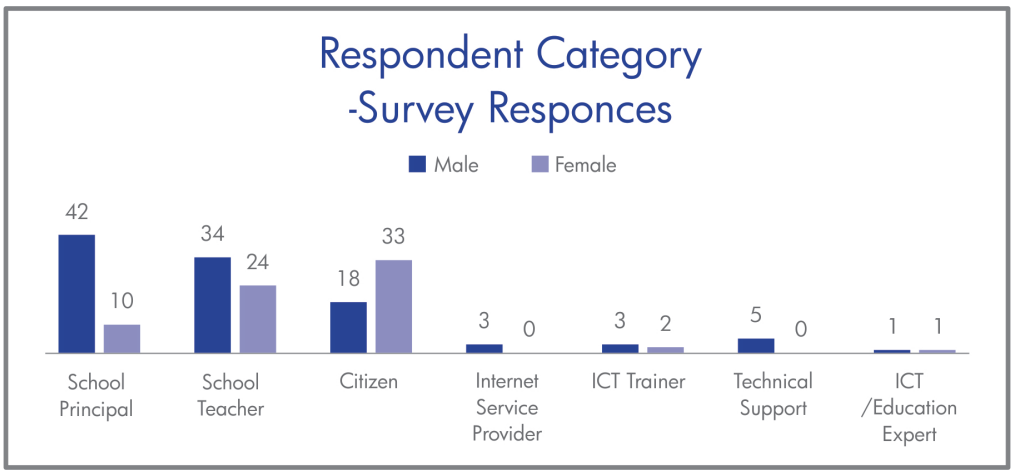
- High Schools and Higher Secondary Schools - School principal/headmasters , teachers, computer lab in-charges or any teacher who can operate a computer well
- IT Trainers / Tech experts
- Technical Support Service staff
- Citizen user respondents
- Government of Mizoram officials (SCERT, RMSA, Dept. of Education etc.)

The survey was conducted via an Android tablet-based questionnaire. The duration of one survey was 30 min to 1 hour.

The total STUDY SAMPLES obtained from 21- 30 Sept 2014 are shown below. These samples include quantitative as well as qualitative responses.

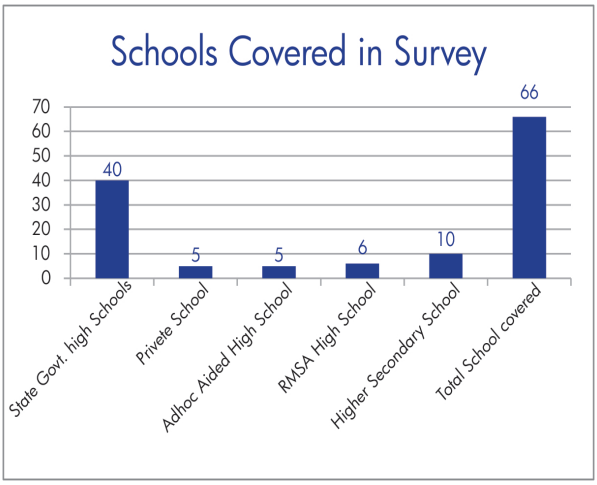
Aizawl District - 5 blocks

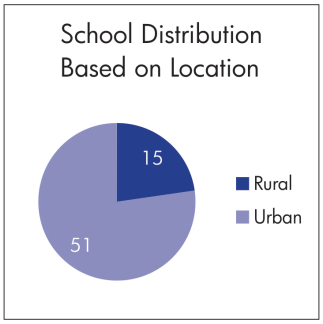
- 66 high schools and higher secondary schools (40 State Govt., 5 Private, 5 Adhoc Aided, 6 RMSA high schools, 10 Govt. Higher Secondary schools)
- 30 citizens in various school locations
- 10-15 Experts from ICT and Education Sector
- 8 Computer Training Centers
- 5 Computer Repair Centers
- 5 Internet Service Providers
- 20 College and University students
- 20 women from different sections
- 1 B.Ed. College



Study samples from high schools and higher secondary schools

Type Of School	School Corvered
State Government high Schools	40
Privete School	5
Adhoc Aided High School	5
RMSA High School	6
Higher Secondary School (11, 12 Grade)	10
Total School covered	**66**





Project and Survey Team

The survey team consisted of the following persons:

Name	Designation	Organization	Survey Responsibility
Dr. Syed S. Kazi	Deputy Director	Digital Empowerment Foundation, Delhi (DEF)	Project Head (DEF) Survey planning and coordination, Conducting meetings with Govt. officials
Shahid Ahmad	Project Director	DEF, Delhi	Developing Android-based questionnaire; Network Feasibility, sustainability planning, budgeting and reporting
Rucha Deshpande	Project Manager	DEF, Delhi	Developing survey questionnaire; Survey planning, Conducting survey, Preparing training budgets and Final Study Report
Harun Ahmad	Regional Coordinator, North-East India	DEF, Guwahati	Survey planning and coordination, Conducting Survey
Ankit Saraf	Research Consultant	Tata Institute of Social Sciences, Mumbai	Conducting meetings with Govt. officials, Conducting survey
Dr. Lalbiakdiki Hnamte	Assistant Professor	Dept. of Education, Mizoram University	Advisor and Support for survey planning
Jennifer Malsawmtluangi	M.Phil. Student	Dept. of Education, Mizoram University	Conducting survey in schools
Hmangaihi	M.Phil. Student	Dept. of Education, Mizoram University	Conducting survey in schools
Ajay Rai	Graduate	NIELIT, Aizawl	Conducting survey in schools, obtaining school latitude/longitude for network planning
H. S. Lalramchuana (Peter)	Block Project Co-coordinator	Open Doors-NERLP	Obtaining school latitude/ longitude for network planning
Lalrammuani (Nutei)	Area Coordinator	Open Doors-NERLP	Obtaining school latitude /longitude for network planning
Lalrinkima Bawlte	Development Officer	Tata Trust, Mumbai	Survey Support

Methodology of the survey

Survey of schools

The overall methodology for the study was primarily based on data collection from the field (quantitative and qualitative) on identified variables (dependent and independent variables) and based on set parameters.

For the respondents belonging to category of schools and high schools, the school principal or a teacher knowledgeable about computers (if applicable) was selected for the survey. Math, Science and English school teachers were also selected to get an idea about the usage of technology by teachers and students, especially for subject teaching and learning.

The accuracy of the information provided was also verified by speaking with other teachers, visiting the computer lab or observing other computer-related infrastructure in the schools.

The school principal and the computer operator were asked questions regarding:

- Internet connectivity and access
- Power Supply
- Computer and Supporting Devices/Software Usage in school
- Computer and Supporting Devices/Software Usage at home
- Gaps and problems encountered for integration of technology into Education
- Technical Support Services and IT Training facilities

The school teachers were questioned about:

- Their knowledge and usage of computers, mobile phones and Supporting Devices/Software at school and home
- Students' knowledge and usage of computers, mobile phones and Supporting Devices/Software at school and home
- Usage and Access of Internet at school and home
- Impact of technology on the teaching-learning process
- Gaps and problems encountered for integration of technology into Education

Citizen respondents were picked up randomly in an unbiased manner in areas nearby schools. They were asked about:

- Their education level and occupation
- Internet connectivity, access and usage at home
- Usage of computers, mobile phones and supporting devices at home
- Usage of technology for Education at home
- Willingness to support Internet and technology-based Education in schools

Computer/IT Training Centers were questioned about:

- Experience, Knowledge and Expertise in Information and Communication Technology (ICT) training
- Courses covered by Training Center
- Ability and challenges to develop courses and provide support to high schools in Aizawl district
- Availability of Human Resources to provide training to high schools

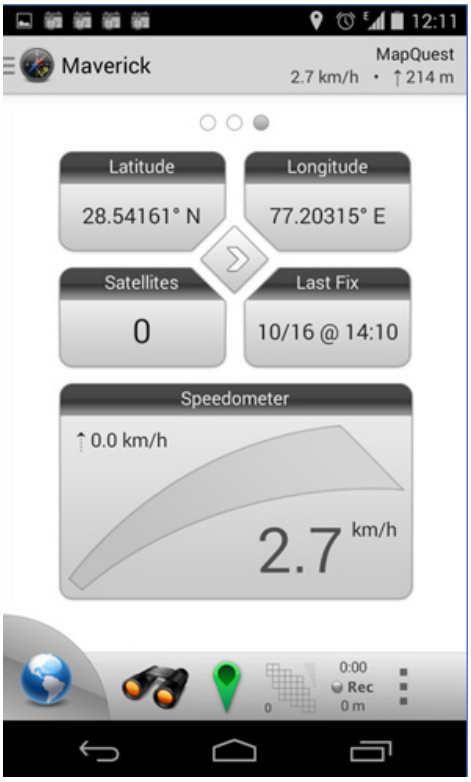
Technical Support Personnel were asked about:

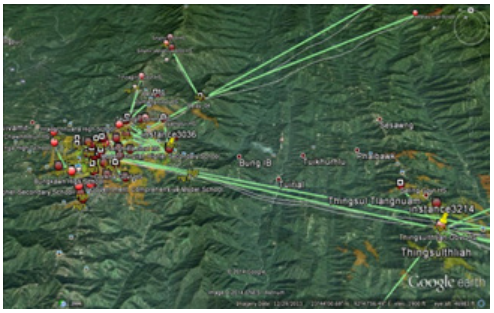
- Current and Future Technical Support provision to high schools in nearby areas
- Manpower for and Speed of Support Delivery
- Various technical issues encountered in devices

Internet Service Providers were asked about:

- Current Connectivity provided to schools – gaps and challenges
- Feasibility and sustainability of Internet Connectivity in every area of Aizawl District
- Details about suitable plan for schools
- About their technical service provision

Network Planning Survey



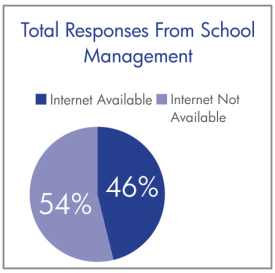


2 Key Findings of the Survey

The key findings from all respondent categories have been briefly mentioned below.

Responses from School Head/ Computer Expert

School Principals/Computer Experts were available in 52 of the 66 schools visited. So responses are available from only 52 school management respondents.
As per the chart shown here, more than 50 % schools in Aizawl district do not have internet connectivity.

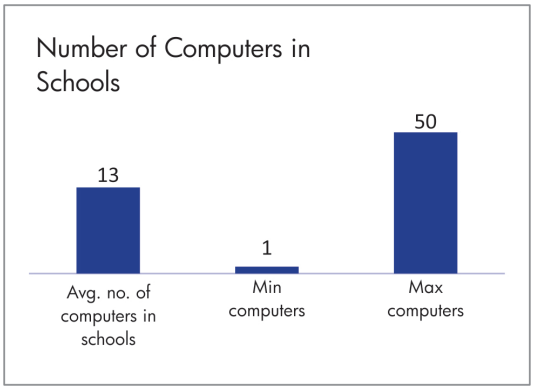


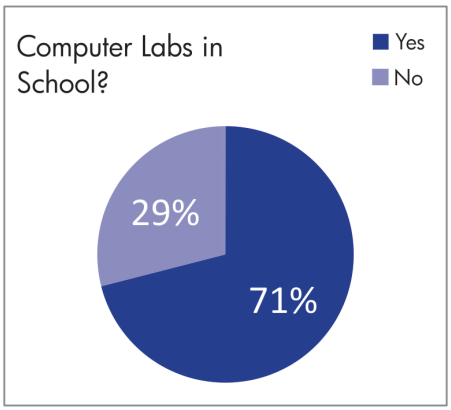
Internet Connectivity and Survey

Type of Internet Service	**Of the 24 schools which have internet connectivity, many use either** wired or wireless broadband services **based on availability. Some of them also use 3G dongle as their BSNL lines got cut off few years ago.**
Internet Service Provider (ISP)	The main ISP for all Aizawl schools is BSNL, followed by Airtel 3G.
Internet Speed	66% of the schools have Internet speed of 512 kbps. This is the maximum speed provided as per the BSNL plan for the schools.
Duration of Internet Availability	8 out of 12 hours during school operation
Support Services from ISP	Slow and incompetent for 79 % schools.

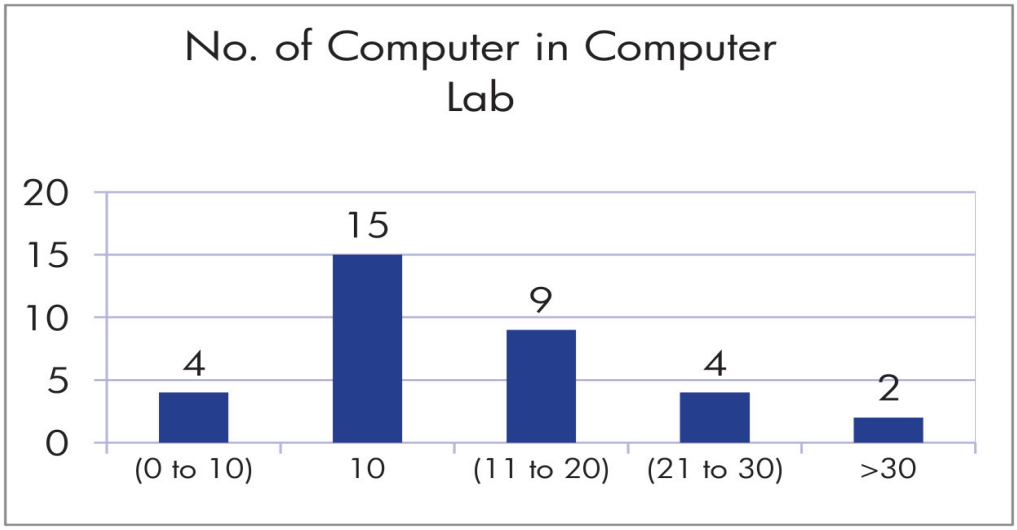
1. Broadband Internet Facility is provided in Aizawl district mainly by **BSNL**. However the connection lines to schools have been damaged and the connection disrupted in majority of schools and not repaired since years.
2. Most of the schools which have Internet facility use it via **3G dongle** (mainly **Airtel**) or use mobile Internet in Smartphones. Other popular ISPs are Aircel and Vodafone.
3. **Average Internet Speed** available is not more than **512 kbps.**
4. **More than 90 % schools in rural areas do not have any kind of Internet connectivity.** BSNL towers are present in most villages but service is slow, incompetent and connection lines to schools have been damaged, discouraging schools from getting Internet facilities
5. Teachers don't have proper knowledge about using internet for education.

Computer and Supporting Devices/ Software Usage in school

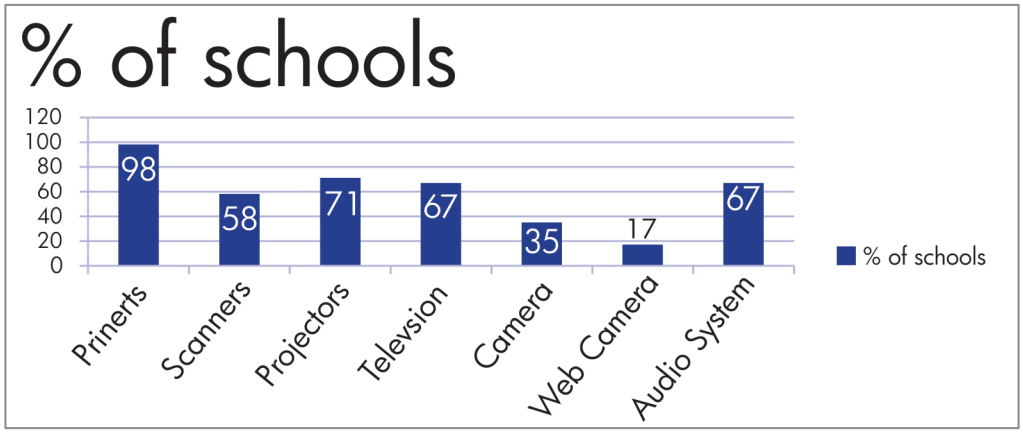




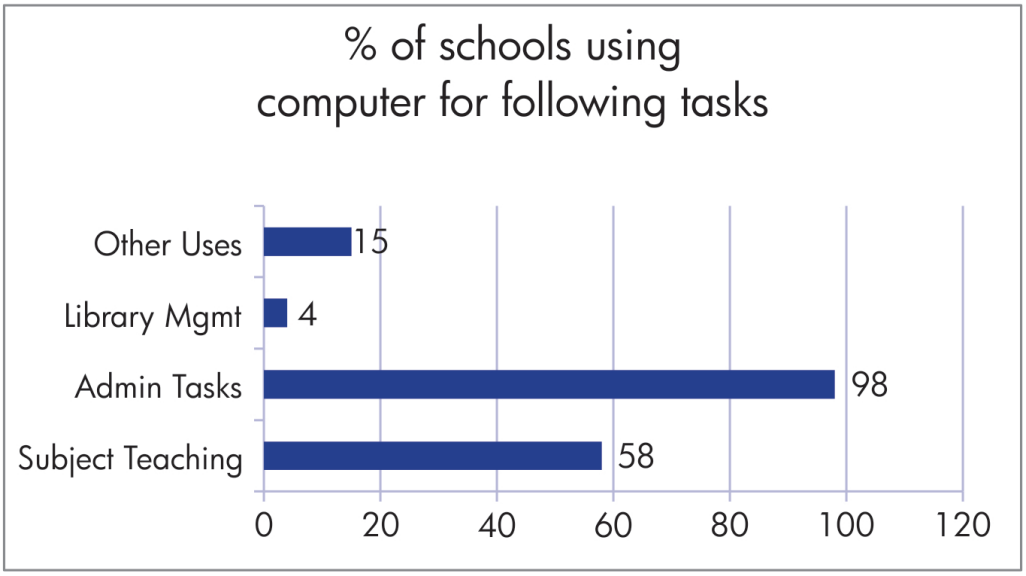
The average number of computers in each school is 13, with the minimum to maximum range very large. Surprisingly, 71 % schools visited had computer labs, but not used frequently.



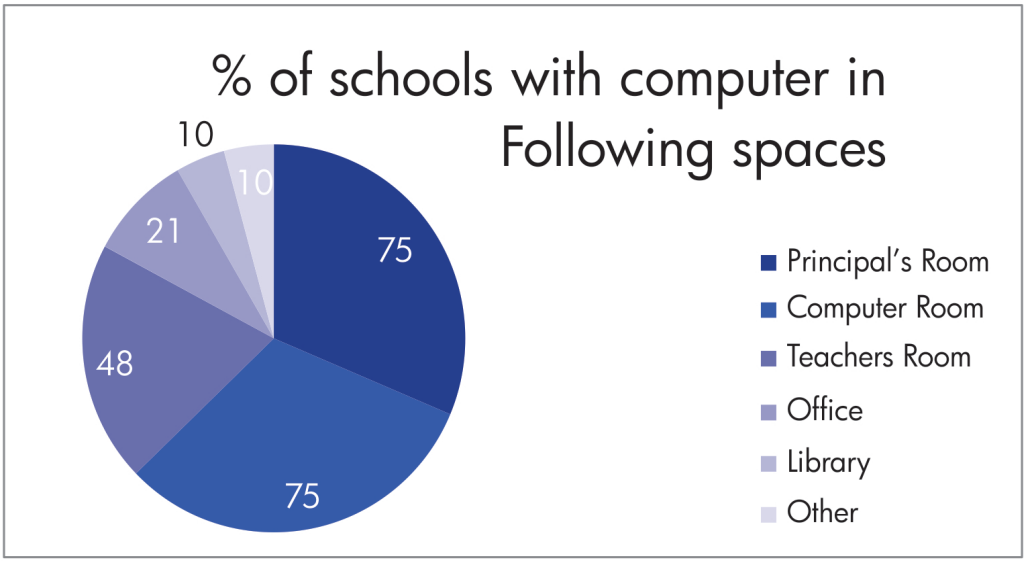
1. SCERT (State Council of Educational Research and Training), Mizoram has provided 10 computers, 10 UPS and 1 projector to most of the schools in urban and rural areas, as is clear from the previous graph. Many schools in urban and very few schools in rural areas have setup a computer lab. Mizoram Board of School Education (MBSE) and
2. Rashtriya Madhyamik Siksha Abhijan (RMSA) has also provided computers to some schools.
3. Around 60% of the computers provided are operational in most schools however UPS devices are not working in majority schools.
4. Enough space is available in 73 % classrooms of all schools to setup a computer, projector and projection screen.
5. Space is available in 70 % schools to create a computer lab fitting around 10 computers.
6. The average student to computer ratio across all schools is 5. . Printers are the most common supporting devices available in all schools. Projectors and televisions are also common as they are provided by the Mizoram Govt.



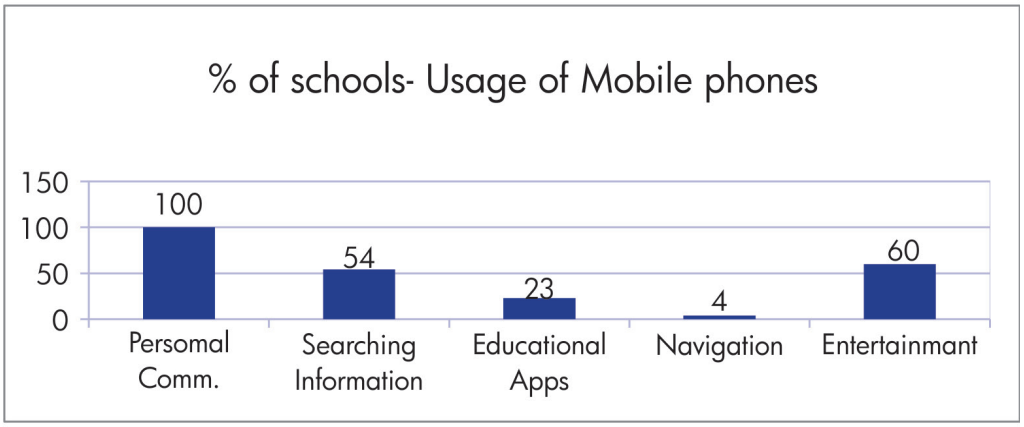
7. Computers provided by SCERT, MBSE or RMSA are mainly being used for administrative tasks like typing official documents or question papers and printing them or for entertainment purposes like playing games. Most computer labs are rarely accessed by teachers and almost never by students. One Computer operator is usually present in most schools for performing these admin tasks.



This trend is also visible from the locations in which computers are placed inside schools. As we can see from the graph below, most computers are placed in the Principal's room, computer lab and staff room.



8. Compulsory IT subject in schools has been removed from syllabus by the Dept. of Education, Govt. of Mizoram. Due to this, most schools do not have trained IT teachers and are unable to hire IT teachers due to lack of funds and funding support from the Govt.
9. In most Higher Secondary Schools (HSS), computer labs are setup only for the students having specialization in Computer Science. Students from other specializations do not learn about computers and technology.
10. Mobile phones with Internet facility are being used by most teachers. The usage is restricted to social networking, playing games and searching for information.



Power Supply in schools

Electricity Supply	**Consistent and good in most school localities.**
Power cuts	Majority are experiences during rainy seasons. Overall, 25% schools experience long power cuts throughout the year
Power back-ups	Available in 28% schools
Number of plug-points	**Sufficient** in classrooms (1-2) as well as computer labs (>15) wherever applicable
Voltage Supply	Consistent and not fluctuating in 75 % of the schools
Earthing	Done in majority schools

Technical Support

Onsite technical support	Not available in 79% schools
Offsite technical support	Used by only 50 % schools. Rest of them throw away or stop using broken computers and devices.
Challenges behind getting technical support	Lack of funds from the government and inability of the schools to generate funds on their own.

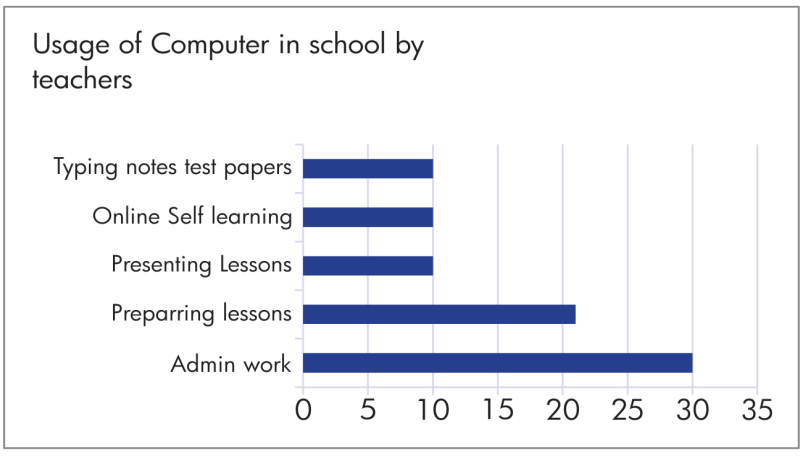
Responses from School Teachers

56 out of 58 teachers who were interviewed could use computers. This was because the school principals asked only the teachers who had some knowledge of computers to discuss with the survey team. These 56 teachers who had basic to advanced level of knowledge in IT informed that only 1-3 teachers per schools had knowledge of computers and Internet.

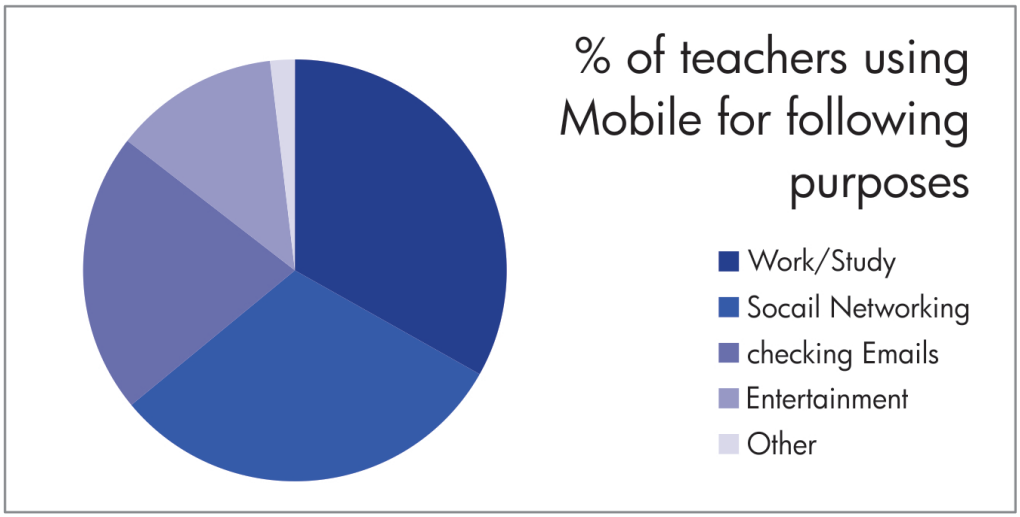
The computer-aware teachers gave information on the following:

Computer and Supporting Devices/Software Usage at home

1. Most teachers use computers in school for administrative tasks or preparing lessons.



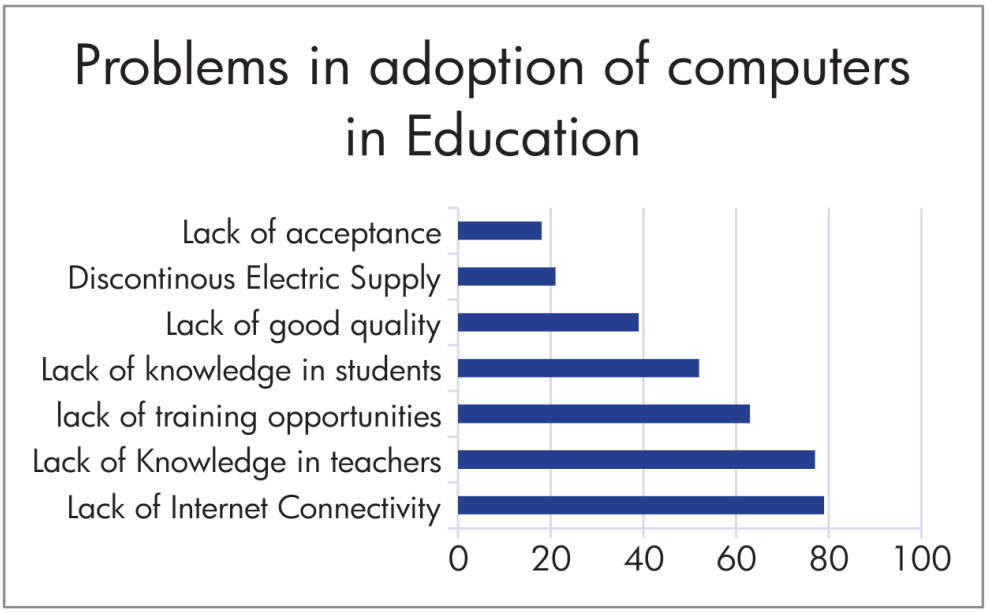
2. Mobiles phones are being used by teachers mostly for social networking, working/studying or checking emails



3. Only 36% teachers were trained in IT. Most of them received training from SCERT while a few had a degree/diploma in Computer Science and IT.
4. Most teachers in Aizawl city schools have a desktop (PC), laptop and a smartphone.
5. Internet facility at home is mostly available via 3G data card or mobile 3G Internet.
6. Usage of computers for majority teachers in urban schools is restricted to social networking, playing games and online shopping.
7. Most teachers in schools outside Aizawl city do not have a Personal Computer or Internet facilities at home.

Gaps and problems encountered for integration of technology into Education

1. The main problems identified by teachers for adopting computers in education are: lack of Internet connectivity and lack of knowledge in both teachers and students.
2. Lack of a trained Computer/IT teacher in the school has been pointed out as a big challenge towards teaching students about ICTs. Majority schools have maximum 1-2 teachers who have basic knowledge of computers. Some of the teachers who have been trained by SCERT indicate insufficient training which quickly becomes outdated. Subject-based IT-training for teachers was deemed necessary.



3. Projectors provided by SCERT are not used by 99 % schools, mainly due to lack of knowledge among teachers to prepare a PowerPoint presentation. However, usage of projectors in schools has been identified by teachers as the most popular and effective technique to engage and inform students and for subject-specific teaching.
4. Lack of acceptance and lack of awareness of technological development is the main gap identified for teachers' inability at learning about technology. Lack of interest and lack of time have also been identified as minor challenges towards learning about computers and Internet.
5. Optional Computer Education subject was also another cause for schools not taking IT Education seriously. Making the subject compulsory would be a way to motivate teachers to learn and incorporate technology in education.

Discussion with Internet Service Providers

BSNL is the main service provider which provides Internet facilities to the schools in Aizawl district. On having a detailed conversation with them, BSNL informed the survey team that Internet facilities are good in the Aizawl city area with an average speed of 512 kbps. If required, speed of 1 Mbps can also be provided. The connectivity in rural areas, however is not very good.

Selecting an Internet connection plan: As per BSNL, they were not consulted prior to selecting the current school Internet plans. The current plan has a low monthly rental with poor speed and is insufficient to meet the school needs.

Ongoing Maintenance Support: BSNL does not have sufficient manpower to provide support to 60-70 schools. However, it can provide a 1-2 day training to one selected school teacher for setting up the Internet connection, basic repair and maintenance of Internet. BSNL also suggested that each school should have one dedicated person for urgent Internet maintenance.

Responses from Computer and IT Training facilities

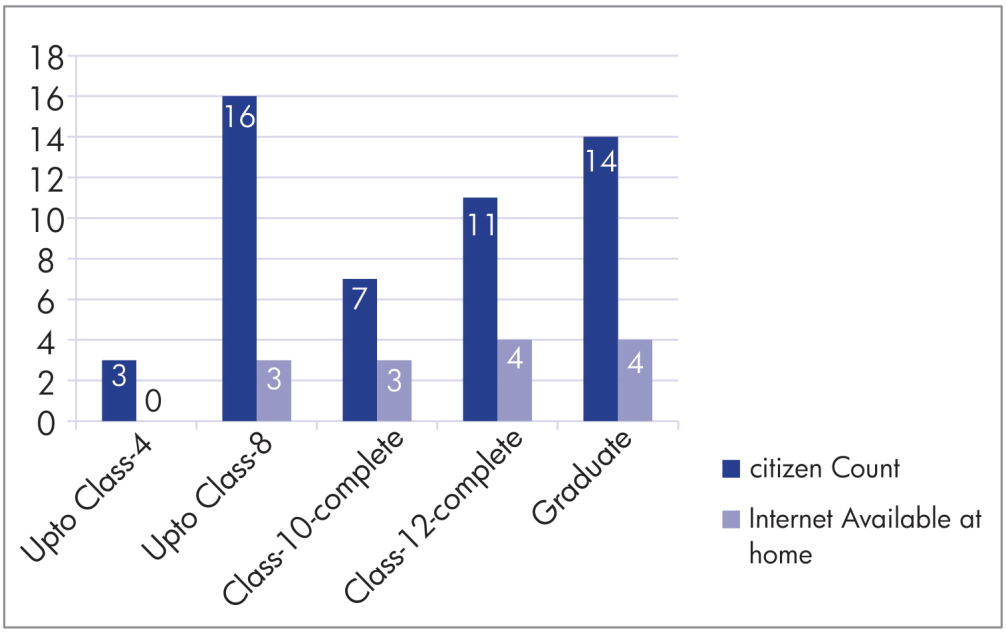
1. Multiple private and Govt. affiliated Computer Training institutes are present in Aizawl city. However no training facilities are available outside Aizawl city.
2. Most Govt. Affiliated courses in the training centers are of duration of 6-months to 1 year.
3. The training centers interviewed have not been involved in training teachers or students in schools through a partnership with schools. Individual students have enrolled in the centers for learning ICTs.
4. Lack of time, lack of relevant experience and insufficient financial motivation were identified as the major challenges towards providing training to schools.
5. SCERT has provided 2 weeks to 6 months training for 1-2 teachers in most urban and rural schools in Aizawl. However, ongoing training is not provided and teachers are unable to retain the knowledge obtained and hence to utilize it in schools. The duration of 2 weeks for the training program has been identified as insufficient by most teachers and it also gets outdated very soon.

Responses from Technical Support Centers

1. 2 out of the 5 Support Centers interviewed have provided some sort of computers sales and support services to schools.
2. The Support Centers identified that the most common problems like Security issues, slow computers, network issues, etc. can be solved by school authorities after basic training
3. No technical support centers are available outside Aizawl city.

Responses from Citizen Respondents

1. Out of the 51 citizens interviewed, only 14 had internet connectivity in their homes, as can be seen from the graph below. Among the citizens interviewed, the average number of households with Internet connectivity is only 27%.



2. Most Citizen Respondents in rural areas did not have access to Internet or computers at home. The situation was not much better in the city area too.
3. Lack of awareness about technological development was the major challenge identified in rural areas.
4. Poor internet connectivity, lack of necessity and lack of funds were the main causes for not having an Internet connection at home.
5. Most common ISPs are BSNL and Airtel (3G) with the most common speed being 512 kbps.
6. Computers are mostly used by citizens for personal communication and entertainment.
7. There is a need to create awareness about positive usage of internet and computers.

3 Broad Recommendations

Recommendations related to school staff training

A lack of vision and mission for using computers in school education was found be a major deterrent in effective usage of technology for education amongst schools surveyed in Aizawl district of Mizoram. An integrated approach towards connectivity-based education like the proposed TATA-MIT Initiative would incorporate content planning, development and delivery using ICTs and would be able to address the vision and mission of the schools successfully. A few recommendations have been made in this regard:

1. Before the pilot program is rolled out in Aizawl district schools, an amount of basic training / orientation needs to be provided to school staff to ensure their e-readiness to deliver the high-end ICT-based education.

Training / orientation material should be developed for the same purpose. The details of the training programs can be found below.

The TATA-MIT team would be focusing on developing content for Maths, Science and English in the first year of operation. To support this, basic digital literacy training needs to be provided to these three subject teachers in each school, the Principal and two designated computer lab-in-charges. The duration and tentative budget of the training program is provided in the Budgets chapter.

Topic of Training	Target Audience	Duration
Basic Computer Literacy Teacher Training	1. School Principal 2. Maths Teacher 3. Science Teacher 4. English Teacher	120 hours
Computer Infrastructure Repair and Maintenance	1. Computer Lab In-charge 2. Additional Teacher	120 hours

BSNL had expressed interest in developing and providing a training program on Computer Repair and Maintenance. TATA Team can explore this opportunity.

2. In this regard, collaboration with local Training Centers like SCERT in Aizawl and Dept. of Education, Govt. of Mizoram could be relevant in providing regular annual or bi-annual training to all or selected school staff. Basic Computer Literacy training can be provided

to selected teachers initially and all teachers eventually. This would positively contribute in technology-enhanced subject-based learning and teaching.

3. Towards this, engaging the Dept. of Education, Govt. of Mizoram about re-including Computer Education and computer aided subject learning in the school syllabus for improved interest and usage of computers and Internet could have long term positive impact through the proposed TATA-MIT initiative.
4. A small training center can also be started by collaborating with local training staff or external training agencies. The tentative budget for the Centre setup has been provided in the Budgets chapter.

Recommendations related to School Infrastructure

For the proposed TATA-MIT initiative, there are few gap areas related to school infrastructure including technical support system that shall require plan and programme focus. It is recommended the following:

1. It is recommended to provide additional infrastructure in schools where Student-Computer (S-C) ratio is not satisfactory and other supporting technology is not available for classroom or computer lab-based education. Engaging the State agencies like RMSA to provision solutions for this gap area is recommended.
2. 2. Additional hardware and supporting infrastructure that needs to be provided to schools based on project requirement shall be:

    a. 1 Computer, 1 Projector and 1 Projection Screen in each classroom
    b. 10 Computers in a Computer Lab
    c. Furniture, blackboard in Computer Lab
    d. Audio System (Mic + Speaker) in each classroom
    e. UPS for each new computer and all old ones whose UPS is not working
    f. Generator for power backup of entire school during power cuts (to last for 3-6 hours)
    g. LAN connectivity for each computer lab

3. There shall require regular supply, repair and maintenance of computer related supplies. It is recommended that TATA Trust / Other Funding Agency can provide funds for purchase and ongoing repair and maintenance of computer-related supplies for schools. Alternatively, state education agencies like RMSA must be engaged to fill this basic gap area.
4. The detailed budget for the infrastructure mentioned above has been provided in the Budgets chapter.

Recommendations related to Internet connectivity

1. Despite the presence of government owned BSNL network, there is a need for an integrated access and connectivity plan of action in all government and government aided and supported schools in Aizawl district. This plan should be aligned with the broad plan of content delivery and access based on curriculum and higher knowledge needs for higher level of knowledge building and capacities in students as well as teachers. Existing limited access provisions in few government schools (without any vision and mission to use internet) is not enough to meet the needs of the project. A stronger network backbone with seamless Internet connectivity has to be setup in the Aizawl district region to serve the purpose.

2. Wireless network emerges as an alternative solution to fill the gaps in seamless and dedicated internet and intranet services to schools. Private Internet Service Providers (ISPs) like Airtel can be tapped for the same purpose, wherein selected ISP can set up wireless network with a given dedicated clientele in government schools with assured Return of Revenue (RoR).
3. High Speed Network connectivity plans with BSNL can be tapped into for improving access to schools which currently use BSNL Internet. However, BSNL Internet has not yet reached up to the last mile and providing connectivity to remote locations would be a challenge in this option.
4. Community wireless network is seen as the best alternative for wireless-based access in Aizawl high schools. This will be modeled on a community owned not-for-profit venture that will run a wireless network and provide access to government schools and other community clients, generate resources and reinvest to sustain the network.

4 Connectivity Plans

Towards the proposed TATA-MIT education initiative, the following are recommended as possible approaches for solutions in seamless high bandwidth connectivity and access in Aizawl schools through wireless network:

Possible Plans for Internet Connectivity & Access Sustainability & Feasibility	**PLAN A:** • Private ISP like Airtel or Tata Tele Services identified and partnered to set up and provide wireless network to connect the schools with assured school clientele and RoR. • In this case, Tata-MIT has to ensure RoR for the identified ISP service provider on and behalf of the school constituencies. • The challenge of sustainability and feasibility shall be taken into consideration in the partnership and business agreement between the ISP and TATA-MIT given the assured RoR from schools as well new clienteles for the ISP around school constituencies.
	PLAN B: • In regard to Community Wireless Network (that DEF proposes), Trust to provide one time infrastructure set up cost in proposed number of locations based on need and wireless network techno-feasibility study or wireless network feasibility study; • The Community Wireless Network not-for-profit venture to deploy, run and manage connectivity & access to schools under the proposed project; • The venture to provide connectivity & access to all government high schools under the project without asking for recurring cost and expense from Tata-MIT from second year; • The venture to sustain the operations based on revenue generation from non-school clients and other potential clients. And reinvest the generated revenue from other clients for the project sustainability.

5 Technical Feasibility Study

Figure 4: Aizawl on the Map of India

Aizawl district is located in the North-eastern state of Mizoram. Aizawl city, the capital of Mizoram has been shown in the map of India on the previous page.

Aizawl is located at an altitude of 3500 feet (1132 m) above the sea level. Situated in the central part of Mizoram state, it is surrounded by river valleys and green hills. The Tlawng river valley lies to its west while the Tuirial river valley is on the east. The Durtlang hills act as a barrier south of Aizawl and the Mizo villages lie in between the hills.

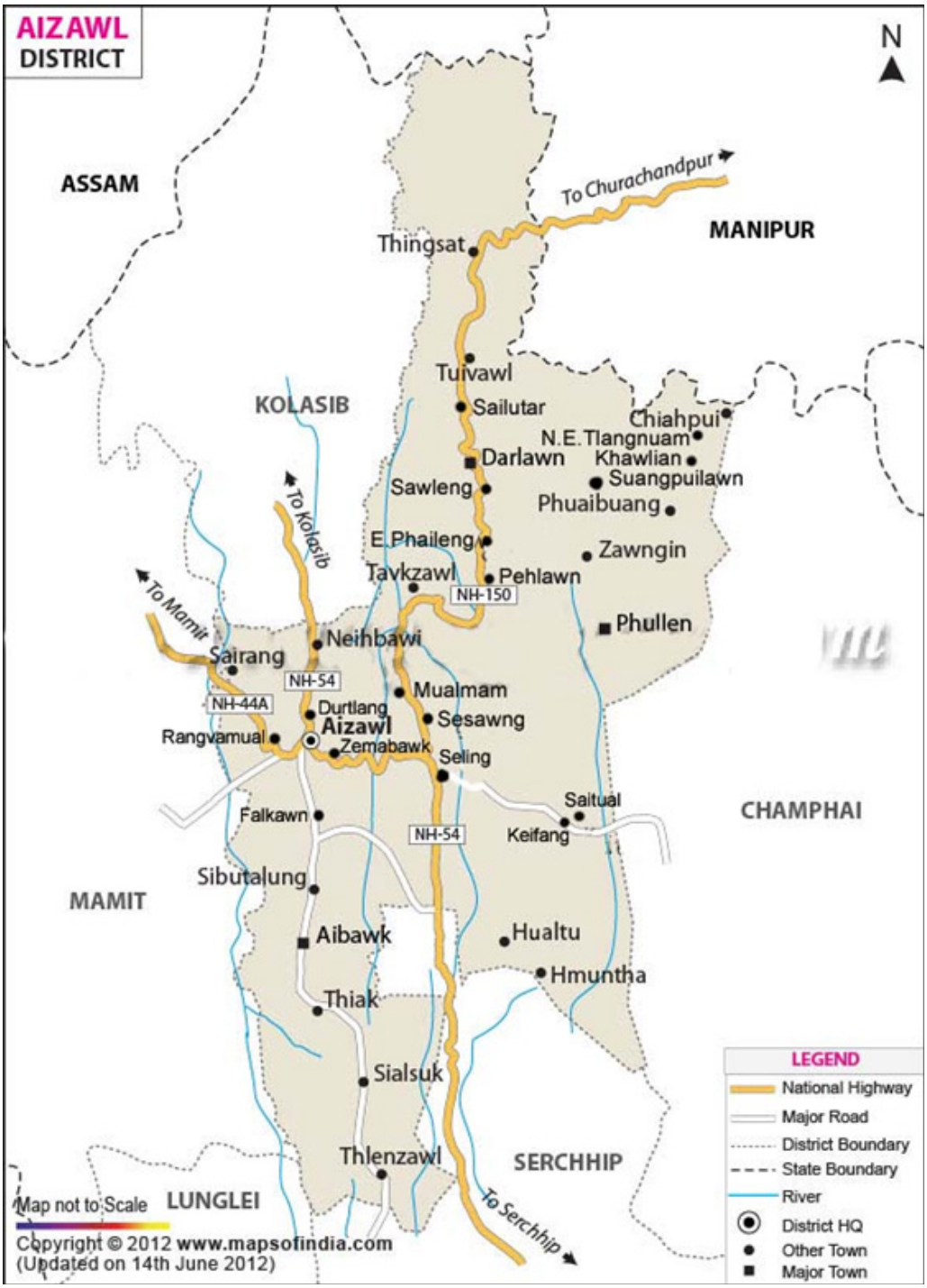


Figure 5: Aizawl District Map
(Ref: http://sericulture.mizoram.gov.in/uploads/files/aizawl-dist-map.jpg)

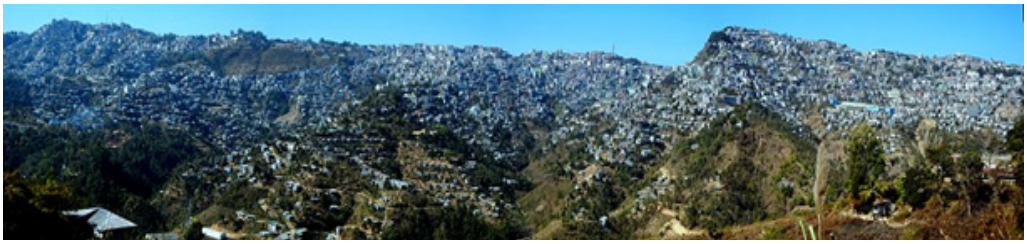


Figure 6: Aizawl district panoramic view
(Ref: Wikipedia)

Figure 7: Aizawl city
(Ref: https://upload.wikimedia.org/wikipedia/commons/b/b1/Aizawl.jpg)

Being a hilly region, Aizawl has too many variances in latitudinal and longitudinal positions as well as altitudes for the schools which had to be mapped and pinned on Google Earth to develop a wireless connectivity plan. Hence, a wireless network feasibility study covering all identified schools / locations was conducted. This feasibility study has contributed in making all network infrastructure budgets, business plan for setting up community wireless network and the sustainability plan to sustain the Internet connection after the first year.

The wireless feasibility study was conducted using:

- Maverick GPS Android-based Application
- Google Earth
- PTP Link Planner software tool

The summary of the Network Feasibility Study including all aspects of feasibility is given below.

A feasibility study is an evaluation and analysis of the potential of the proposed project which is based on extensive investigation and research to give full comfort to the decisions makers. Feasibility studies aim to objectively and rationally uncover the strengths and weaknesses of an existing proposed project, opportunities and threats as presented by the environment, the resources required to carry through, and ultimately the prospects for success.

The acronym TELOS refers to the five areas of feasibility -

- Technical
- Economic
- Legal
- Operational and
- Scheduling

Five Areas for Network Feasibility

Technical Feasibility

For the study of technical feasibility; we visited Aizawl for finding the strengths & weaknesses of this area for implementation of wireless network in Aizawl district.

As per our observation & study; we found that except Aizawl district headquarters most of the blocks are lacking good internet connectivity.

Our emphasis is to connect all 68 schools from Aizawl district which were visited during the Feasibility Study survey. We have selected Aizawl city block as the main broadcasting center because here we can get the best internet bandwidth from any good class-A ISP (Internet Service Provider) like Airtel, Tata & BSNL.

The district Aizawl is a hilly region and this is the major weakness for deployment of wireless network especially when we are going to use unlicensed band (free spectrum) because unlicensed frequency band (2.4 GHz & 5.8 GHz) cannot cross a barrier. This frequency works only within line-of-sight (LOS) due to small wavelength.

For overcoming this problem (hill barrier between point to point connectivity); we decided to put a tower on the hill top for connecting two schools. For putting tower on hill top, there are two advantages and one limitation. The first advantage is that it reduces the tower height and the second advantage is less losses of microwave signal in the dense forest due to height of tower. The limitation is absence of electricity on the top of hill; for providing power to wireless equipment.

So, we have decided to use solar power especially for hill top tower. In this area, the weather is sunny during 98% days of the year. We can hang a solar panel and battery on the tower.

After overcoming the obstacles of hill barriers and lack of sources of power, our focus was selecting best locations for putting minimum number of towers in between two schools and connecting all 68 schools of Aizawl.

We have done the technical feasibility report on the basic of following considerations:-

1. PTP LINK Planner Proposal Report: The PTP LINK Planner is an application that runs on Windows or Macintosh. It performs the calculations from the ITU (International Telecommunication Union) recommendations ITU-R P.526-10 and ITU-R P.530-12 to

predict NLoS (non-line-of-sight) and LoS (line-of-sight) paths anywhere in the world. Path profile data can be obtained in a number of different ways depending upon global location. PTP LINK Planner provides a method for obtaining path profile data; see Path Profiles. Trees and buildings (obstructions) can modify this profile, and often the path must be surveyed to establish the correct estimation.

The main concepts of PTP LINK Planner are:

- Project: a set of data about the sites and links in a wireless network.
- Site: the location of a PTP outdoor unit and its antenna.
- Link: a wireless connection between two sites.
- Path: an alternative wireless link between two units at different sites, when each site has multiple units.

After getting geographical details, we calculated the longitude, latitude & height from sea level through an Android-based GPS application Maverick. Then, we started analysis for PTP connectivity through LINK Planner software. After several changes in selected locations, the most optimum location selection was obtained for connecting all blocks.

The detailed analysis of each location & node is given in the main report.

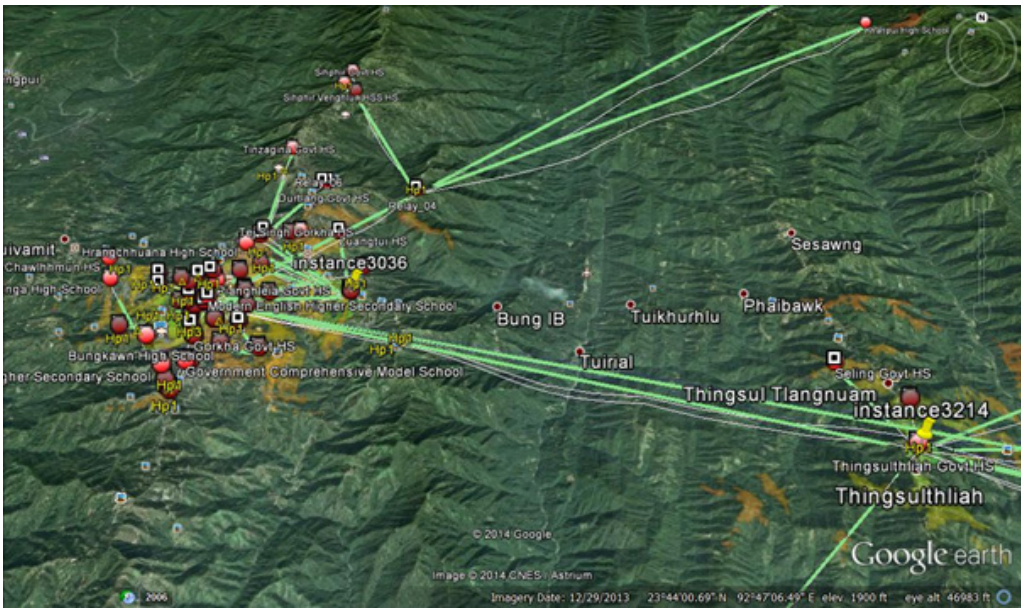
2. PTP LINK Planner Installation details: The proposal and installation details are created for a link, not path. The standard reports only show performance information for the primary to primary path. This includes the predicted receiving power at both the primary and secondary units at one end from the primary unit at the other end. The detailed reports contain both installation and performance information for each of the path combinations.

The detailed analysis of each location & node is given in the main report.

3. Coverage area: The coverage of a wireless signal from tower is the geographic area where the client device can communicate. Coverage depends on several factors, such as orography (i.e. mountains) and buildings, technology and radio frequency.

Coverage area of Aizawl's 68 schools and 7 relay base on -80 dBm is 3 kilometer in 360 degree from each tower.

The coverage area for Aizawl district is shown below:



The detailed coverage area report is given in the main report.

4. Tower location & height: The details of each tower like required height of tower and tower's location details like longitude & latitude are given in main report.

Economic Feasibility

Economic Feasibility implies that the project benefit of the proposed system outweighs the estimated cost which is usually the whole cost of deployment.

This must include:

1. Ongoing support: Estimated cost in each of the following areas: People, including IT staff, Hardware and other equipment and software expenses.
2. Maintenance cost: Estimated maintenance cost calculations along with the sustainability plan.

The one-time and ongoing costs along with the sustainability plan can be found in Chapter 6.

Legal Feasibility

This report discusses spectrum policies and regulations provisioned by the Government of India. The report aims to demonstrate the need for and importance of unlicensed spectrum as a cost-effective medium for providing connectivity in rural/remote areas of the country.

Licensing of Unlicensed Bands: 2.4 GHz to 2.4835 GHz

According to WPC Wing of the Ministry of Communication & Information Technology:

"Notwithstanding anything contained in any law for the time being in force, no license shall be required by any person to establish, maintain, work, possess and deal in any wireless equipment, on non-interference, non-protection and shared (non-exclusive) basis, in the frequency band 2.4 GHz to 2.4835 GHz.

Licensing of Unlicensed Bands: 5.150 to 5.350 GHz and 5.725 to 5.875

The WPC Wing of the Ministry of Communications and Information Technology under its notification Jan 2005 has de-licensed 5.8 GHz Band:

"Notwithstanding anything contained in any law for the time being in force, no license shall be required by any person to establish, maintain, work, possess or deal in any wireless equipment for the purpose of low power Wireless Access System, including Radio Local Area Networks, in the frequency band 5.150 to 5.350 GHz and 5.725 to 5.875 GHz.

Operational Feasibility

Operational feasibility is a measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development.

An evaluation was done to determine whether the system is operationally acceptable. It also determined how the proposed system will fit with the current operational system.

We have done the operational feasibility report on the basic of following considerations:-

1. **Network planning:** Network planning and design is an iterative process, encompassing topological design, network-synthesis, and network-realization, and is aimed at ensuring that a new network or service meets the needs of the subscriber. The process can be tailored according to each new network or service.

We have done the network planning report on the basic of following considerations:-

a.Complete Network Diagram: Complete Network Diagram is a schematic representation of the interactions of devices on a network. A Network Diagram shows the devices that enable a network, such as devices that access the network.

Details have been mentioned in the main report.

2. **Preparation and estimation (H/W & S/W):**
The preparation and estimation (H/W & S/W) is used to support deployment of system requirements to individual location based and to support assessment of the compliance to requirements.

We have done the estimation of (H/W & S/W) report on the basic of following considerations:-

a. Towers required for Aizawl District

b. H/W & S/W Equipment required for Aizawl District

The details of towers, hardware and software are given in the next section.

Scheduling Feasibility

A project will fail if it takes too long to be completed before it is useful. Typically this means estimating how long the system will take to develop, and if it can be completed in a given time period using some methods like payback period. Scheduling feasibility will be calculated once the project implementation begins.

Tower location & height

Sl. No.	Name	Latitude	Longitude	Maximum Height (m)
1	Aizawl East Govt HS	23.73368N	092.73026E	5
2	Aizawl Govt. High School	23.72468N	092.71579E	5
3	Aizawl North HS	23.75063N	092.72461E	5
4	Bawngkawn Govt HS	23.75217N	092.73139E	5
5	Bethlehem High School	23.72968N	092.72625E	5
6	Bungkawn High School	23.71946N	092.70775E	5
7	Central Govt HS	23.72430N	092.72099E	5
8	Central Govt. HSS	23.72435N	092.72593E	5
9	Ch. Chhunga High School	23.73740N	092.69319E	5
10	Chaltlang Govt HS	23.75309N	092.72484E	5
11	Chanmari HS	23.73947N	092.71627E	5
12	Chawlhhmun HS	23.74452N	092.69024E	5
13	Chawnpui Government High School	23.73623N	092.70451E	15
14	Durtlang Govt HS	23.76966N	092.73784E	5
15	Gorkha Govt HS	23.71885N	092.71812E	10
16	Government Comprehensive Model School	23.71264N	092.71813E	5
17	Government Darlawn High School	24.01703N	092.92961E	5
18	Government Dinthar High School	23.72957N	092.71165E	5
19	Government E.Phaileng High School	23.91842N	092.92542E	10
20	Government Mamawii High School	23.71282N	092.71903E	5

21	Government Republic Higher Secondary School	23.73924N	092.72253E	5
22	Government Sateek High School	23.55115N	092.70535E	5
23	Government Sialsuk High School	23.39506N	092.74835E	5
24	Helen Lowry Higher Secondary School	23.73786N	092.70922E	5
25	Hrangchhuana High School	23.74752N	092.72217E	5
26	I.T.I. Veng	23.71697N	092.73195E	10
27	Institute of Advance Study in Education	23.71782N	092.72378E	5
28	J L Higher Secondary School	23.72202N	092.71658E	5
29	K.M. Govt. Higher Secondary School	23.73618N	092.71161E	5
30	K.V.M. High School	23.73375N	092.72495E	5
31	KVM HS	23.73424N	092.72468E	5
32	Keifang Govt HS	23.67466N	092.96243E	5
33	Khanpui High School	23.85706N	092.90407E	5
34	Kulikawn Govt HS	23.70782N	092.71544E	5
35	MICE Govt HS	23.72431N	092.72080E	5
36	MICE Govt. HSS	23.72430N	092.72096E	5
37	Main Center (Tuikual Primary School)	23.73217N	092.71305E	20
38	Maubawk Govt HS	23.72319N	092.70037E	5
39	Mizo High School	23.73978N	092.71558E	5
40	Modern English Higher Secondary School	23.73094N	092.71758E	36
41	New Millenial HS	23.65976N	092.96481E	5
42	Node 01	23.72947N	092.71712E	5
43	P.G. HS	23.71887N	092.71808E	10
44	Pianghleia Govt HS	23.73639N	092.71794E	5
45	RM High School	23.72933N	092.71312E	5
46	Ramhlun South HS	23.74175N	092.72673E	5
47	Relay_01	23.56645N	092.72229E	10
48	Relay_02	23.73873N	092.98034E	10
49	Relay_03	23.45303N	092.75169E	10
50	Relay_04	23.76786N	092.76064E	10
51	Relay_05	23.94560N	092.92592E	10

52	Relay_06	23.76958N	092.73655E	10
53	Rulchawm Govt HS	23.66378N	092.96533E	5
54	Saitual Govt HS	23.69477N	092.96478E	10
55	Saitual Govt. HSS	23.69477N	092.96478E	10
56	Seling Govt HS	23.71483N	092.85260E	5
57	Sihfa Govt HS	23.74119N	092.98382E	5
58	Sihphir Govt HS	23.82361N	092.73626E	5
59	Sihphir Venghlun HS	23.81301N	092.73871E	5
60	Sihphir Venghlun HSS HS	23.81631N	092.73482E	5
61	St. Pauls Higher Secondary School	23.70581N	092.71695E	10
62	Suanguilawn High School	23.95923N	093.04070E	5
63	Synod Higher Secondary School	23.71166N	092.71346E	5
64	Tanhril Govt HS	23.72791N	092.71558E	5
65	Tej Singh Gorkha HS	23.75270N	092.73387E	5
66	Thingsul Tlangnuam HS	23.70514N	092.86466E	5
67	Thingsulthliah Govt HS	23.69466N	092.86240E	10
68	Tinzagina Govt HS	23.78402N	092.72590E	5
69	Tlungvel Govt HS	23.61247N	092.85090E	5
70	Vaivakawn High School	23.73879N	092.71303E	10
71	Zemabawk Govt HS	23.74264N	092.75011E	10
72	Zemabawk Govt. HSS	23.73414N	092.74852E	10
73	Zemabawk HS	23.73389N	092.74869E	5
74	Zotlang RMSA Secondary School	23.74002N	092.70325E	10
75	Zuangtui HS	23.75389N	092.74289E	10

H/W & S/W Equipment required for Aizawl District

68 schools were pinned onto Google Earth by finding their latitude and longitude. 7 additional relay points were added to develop the network backbone. Network expansion can be planned if required based on the current network design.

To build a strong network backbone, some school locations have been identified as mandatory stations to setup a tower so that maximum ground area can be covered for wireless connectivity. Other school locations would be connected to these main locations through Line-of-Sight connectivity to build the overall network.

Some locations other than schools have also been chosen as relay stations. These relay stations will act as connecting points between two locations which cannot be directly connected through Line-of-Sight.

The hardware and software infrastructure required for the 75 locations has been mentioned below.

Wireless equipment list

S.N	Devices Names	Quantity
1	Mimo Sector Antenna 2.4 GHz 120 Degree 19DBI	6
2	Rocket M2	6
3	Mimo Sector Antenna 508 GHz 120 Degree 19DBI	6
4	Rocket M5	6
5	Integrated 5.8 GHz 27dbm Radio with Antenna	60
6	Integrated 2.4 GHz 23dbm Radio	48
7	Integrated 5.8 GHz 23dbm Radio	19
8	Mikrotik Router RB 1100AHx2	1
9	Switches 24 port	2
10	Switches 8 port	16
11	Cat6 Cable per drum	12
12	RJ45 (D-Link) Pack of 100 P	12
13	Clamper	12
14	Tool set	12
15	D-Link Router	75
16	Extension Cords	16

Power backup list

S.N	Devices Names	Quantity
1	Battery 150AH (Tentative cost)	25
2	UPS 800VA (Tentative cost)	21

Note: The schools marked in red and highlighted in yellow are mandatory locations for network backbone.

SN	Place	Aerial Dist. (km)	PTP Link	Switches 8 port	Switches 24 port	Integrated 5.8 GHz 27dbm Radio	Integrated 5.8 GHz 23dbm Radio	Integrated 2.4 GHz 23dbm Radio	Battery 150AH	UPS 800VA
1	Central Govt. HSS to Central Govt HS	0.504	PTP					2	1	1
2	Central Govt. HSS to I.T.I. Veng	1.022	PTP				2			
3	Central Govt. HSS to MICE Govt HS	0.523	PTP					2		
4	Central Govt. HSS to MICE Govt. HSS	0.507	PTP					2		
5	Ch. Chhunga High School to Chawlhh-mun HS	0.844	PTP					2		
6	Chaltlang Govt HS to Relay_06	2.182	PTP	1		2			1	1
7	Chaltlang Govt HS to Tej Singh Gorkha HS	0.922	PTP					2		
8	Chaltlang Govt HS to Tinzagina Govt HS	3.427	PTP	1		2				
9	Government E.Phaileng High School to Relay_05	3.011	PTP	1		2			1	1
10	Government E.Phaileng High School to Suangui-lawn High School	12.577	PTP	1		2				
11	Government Republic Higher Secondary School to Chanmari HS	0.639	PTP					2	1	1
12	Government Republic Higher Secondary School to Mizo High School	0.712	PTP					2		

13	Government Republic Higher Secondary School to Pianghleia Govt HS	0.565	PTP					2		
14	I.T.I. Veng to Institute of Advance Study in Education	0.838	PTP					2	1	1
15	Main Center (Tuikual Primary School) to Aizawl Govt. High School	0.874	PTM		1			1	4	2
16	Main Center (Tuikual Primary School) to Gorkha Govt HS	1.563	PTM				1			
17	Main Center (Tuikual Primary School) to Government Dinthar High School	0.321	PTM					1		
18	Main Center (Tuikual Primary School) to Helen Lowry Higher Secondary School	0.742	PTM					1		
19	Main Center (Tuikual Primary School) to J L Higher Secondary School	1.179	PTM				1			
20	Main Center (Tuikual Primary School) to K.M. Govt. Higher Secondary School	0.469	PTM					1		
21	Main Center (Tuikual Primary School) to Modern English Higher Secondary School	0.481	PTM					1		
22	Main Center (Tuikual Primary School) to Node 01	0.511	PTM					1		
23	Main Center (Tuikual Primary School) to P.G. HS	1.559	PTM				1			
24	Main Center (Tuikual Primary School) to RM High School	0.314	PTM					1		
25	Main Center (Tuikual Primary School) to Tanhril Govt HS	0.537	PTM					1		

26	Main Center (Tuikual Primary School) to Vai-vakawn High School	0.734	PTM					1		
27	Modern English Higher Secondary School to Aizawl East Govt HS	1.328	PTM		1		1		4	2
28	Modern English Higher Secondary School to Bethle-hem High School	0.896	PTM					1		
29	Modern English Higher Secondary School to Central Govt. HSS	1.122	PTM				1			
30	Modern English Higher Secondary School to Chawn-pui Government High School	1.455	PTM				1			
31	Modern English Higher Secondary School to Gov-ernment Republic Higher Secondary School	1.049	PTM				1			
32	Modern English Higher Secondary School to K.V.M. High School	0.813	PTM					1		
33	Modern English Higher Secondary School to KVM HS	0.811	PTM					1		
34	Modern English Higher Secondary School to Keifang Govt HS	25.737	PTP	1		2				
35	Modern English Higher Secondary School to Maubawk Govt HS	1.953	PTM				1			
36	Modern English Higher Secondary School to Relay_04	5.999	PTP			2				

37	Modern English Higher Secondary School to St. Pauls Higher Secondary School	2.784	PTP			2				
38	Modern English Higher Secondary School to Thingsulthliah Govt HS	15.306	PTP			2				
39	Modern English Higher Secondary School to Zemabawk Govt HS	3.561	PTP			2				
40	Modern English Higher Secondary School to Zemabawk Govt. HSS	3.175	PTP			2				
41	Modern English Higher Secondary School to Zotlang RMSA Secondary School	1.773	PTM				1			
42	Relay_01 to Government Sateek High School	2.422	PTP	1		2			1	1
43	Relay_01 to Tlungvel Govt HS	14.082	PTP			2				
44	Relay_02 to Sihfa Govt HS	0.448	PTP	1				2	1	1
45	Relay_03 to Government Sialsuk High School	6.429	PTP	1		2			1	1
46	Relay_04 to Government E.Phaileng High School	23.662	PTP			2			1	1
47	Relay_04 to Khanpui High School	17.641	PTP			2				
48	Relay_04 to Sihphir Venghlun HS	5.477	PTP			2				
49	Relay_05 to Government Darlawn High School	7.92	PTP	1		2			1	1
50	Relay_06 to Durtlang Govt HS	0.132	PTP	1				2	1	1

51	Sihphir Venghlun HS to Sihphir Govt HS	1.2	PTP	1			2		1	1
52	Sihphir Venghlun HS to Sihphir Venghlun HSS HS	0.539	PTP					2		
53	St. Pauls Higher Secondary School to Bungkawn High School	1.779	PTP	1			2		1	1
54	St. Pauls Higher Secondary School to Ch. Chhunga High School	4.256	PTP			2				
55	St. Pauls Higher Secondary School to Government Comprehensive Model School	0.766	PTP					2		
56	St. Pauls Higher Secondary School to Government Mamawii High School	0.805	PTP					2		
57	St. Pauls Higher Secondary School to Kulikawn Govt HS	0.271	PTP					2		
58	St. Pauls Higher Secondary School to Synod Higher Secondary School	0.74	PTP					2		
59	Tej Singh Gorkha HS to Bawngkawn Govt HS	0.26	PTP	1				2	1	1
60	Thingsulthliah Govt HS to New Millenial HS	11.138	PTP	1		2			1	1
61	Thingsulthliah Govt HS to Relay_01	20.15	PTP			2				
62	Thingsulthliah Govt HS to Relay_02	12.979	PTP			2				
63	Thingsulthliah Govt HS to Rulchawm Govt HS	11.042	PTP			2				

64	Thingsulthliah Govt HS to Saitual Govt HS	10.442	PTP			2				
65	Thingsulthliah Govt HS to Saitual Govt. HSS	10.442	PTP			2				
66	Thingsulthliah Govt HS to Seling Govt HS	2.447	PTP			2				
67	Thingsulthliah Govt HS to Thingsul Tlangnuam HS	1.183	PTP				2			
68	Tlungvel Govt HS to Relay_03	20.358	PTP	1		2			1	1
69	Zemabawk Govt. HSS to Aizawl North HS	3.046	PTP	1		2			1	1
70	Zemabawk Govt. HSS to Chaltlang Govt HS	3.199	PTP			2				
71	Zemabawk Govt. HSS to Hrangch-huana High School	3.068	PTP			2				
72	Zemabawk Govt. HSS to Ramhlun South HS	2.376	PTP			2				
73	Zemabawk Govt. HSS to Zemabawk HS	0.033	PTP					2		
74	Zemabawk Govt. HSS to Zuangtui HS	2.261	PTP				2			
Total Equipment			**16**	**2**	**60**	**19**	**48**	**25**	**21**	

6 Business Model and Sustainability Plan

As per the Plan B for connectivity mentioned in Chapter 4, TATA Team will be providing one-time infrastructure cost for network setup. Infrastructure and training cost, as mentioned below can be provided by TATA Team or other funding agency. The project will be made sustainable from Year 2 onwards and the plan for the same is provided below.
The concise network budget is mentioned here. The more comprehensive budget can be found in the Main report.

Overall Network Development Costs

Table I (OVERALL HEAD)

HEAD	Total
Capital Equipment (including hardware & software) Table-II	6,551,000
Consumables (Table-III)	660,000
Manpower (Table-IV)	1,464,000
Travel & Miscellaneous	500,000
Contingencies	200000
Overheads (@ 15%)	1,654,412
GRAND TOTAL	**11,029,412**

One-Time Infrastructure Costs

Table-II Capital Equipment FE Comp. (including hardware & software) Total = 6,551,000

Project	Description	Cost of one Machine x Total No. of Machines	Total
Aizawl, Mizoram	Wireless Equipment Cost		
(Details in Main Report)		2,330,500	
	Power Backup for Wireless Network		

(Details in Main Report)		490,500	
	Tower Setup Cost		
(Details in Main Report)		2,630,000	
	Wireless Setup Cost		
(Details in Main Report)		500,000	
	Server cost	Rs. 4,50,000 X 1 = 4,50,000	450,000
	Minor infrastructure cost	Rs. 1,50,000	150,000
Total			**6,551,000**

Recurring Costs

Table-III Consumables for one year = 660,000

Project	Description	Monthly Cost x No. of Month	Total
Aizawl, Mizoram	Internet Bandwidth 20 Mbps (1:1)	45,000 x 12 months = 5,40,000	540,000
	Electricity	5,000 x 2 location x 12 months = 1,20,000	120,000
Total			**660,000**

Table-IV Manpower Details for one year = 1,464,000

Project	Designation	No. of Posts	Cost of one Post x Total No. of Post x No. of Month	Total
Aizawl, Mizoram	Network Engineer	2	25,000 x 2 x 12 months = 6,00,000	600,000
	Assistance Network Engineer	4	10,000 x 4 x 12 months = 4,80,000	480,000
	Programmer Trainer	4	8,000 x 4 x 12 months = 3,84,000	384,000
Total				**1,464,000**

Additional School Infrastructure Costs

Table I (OVERALL HEAD)

HEAD	Total
Capital Equipment (including hardware & software) Table-II	16,993,000
GRAND TOTAL	**16,993,000**

Table-II Capital Equipment FE Comp. (including hardware & software) Total = 16,993,000

Project	Description	Cost of one Machine x Total No. of Machines	Total
1. Additional School Infrastructure at Aizawl, Mizoram	Computers in Class room	30,000 x 76 machines = 2,280,000	2,280,000
	Additional computers in Lab	30,000 x 356 machines = 10,680,000	10,680,000
	Projector + Screen	40,000 X 12 machines = 480,000	480,000
	UPS	25,000 x 46 = 1,150,000	1,150,000
	Furniture (Table & Chair)	5,000 x 432 set = 2,160,000	2,160,000
	Audio System (Mic + Speaker)	1,000 x 15 set = 15,000	15,000
	Web Camera	3,000 x 76 set = 228,000	228,000
Total			**16,993,000**

Note:

1. Total sample of schools = 46 (Complete infrastructure information is available for 46 schools)
2. 1 computer, UPS, projector setup, Audio setup and Speaker, Furniture for each classroom where not available
3. Maintaining a Student to Computer ratio of not more than 5, additional number of computers and supporting devices required in the computer lab have been calculated.
4. The projections are approximate as the exact infrastructure information from all schools could not be obtained.

Training Costs

Training program (Course)	No. of Teachers per school	No. of School	Total teachers to be trained
Basic Computer Literacy Teacher Training	4	68	272
Computer Infrastructure Repair and Maintenance	2	68	136
Total			**408**
Total batches (Batch Size: 15 Teachers)			**27**

Table I (OVERALL HEAD)

HEAD	Total
Capital Equipment (including hardware & software) Table-II	1,365,000
Consumable (Table-III)	240,000
Manpower (Table-IV)	1,140,000
Travel & Miscellaneous	100,000
Contingencies	100000
Overheads (@ 15%)	519,706
GRAND TOTAL	**3,464,706**

Table-II Capital Equipment FE Comp. (including hardware & software)
Total =1,365,000

Project	Description	Cost of one Machine x Total No. of Machines	Total
1. Teacher training at Aizawl, Mizoram	Computers	30,000 x 32 machines = 9,60,000	960,000
	Projector + Screen	40,000 X 2 machines = 80,000	80,000
	UPS	1,50,000 x 1 = 1,50,000	150,000
	Printer/ Copier	15,000 x 1 = 15,000	15,000
	Furniture (Table & Chair)	5,000 x 32 set = 1,60,000	160,000
Total			**1,365,000**

Table-III Consumable for one year = 240,000

Project	Description	Monthly Cost x No. of Month	Total
1. Teacher training at Aizawl, Mizoram	Rent	10,000 x 12 months = 1,20,000	120,000
	Electricity	10,000 x 12 months = 1,20,000	120,000
Total			**240,000**

Table-IV Manpower Details for one year = 1,140,000

Project	Designation	No. of Posts	Cost of one Post x Total No. of Post x No. of Month	Total
1. Teacher training at Aizawl, Mizoram	Programmer Coordinator	1	25,000 x 1 x 12 months = 3,00,000	300,000
	Trainer	3	20,000 x 3 x 12 months = 7,20,000	720,000
	Lab assistance	1	10,000 x 1 x 12 months = 1,20,000	120,000
Total				**1,140,000**

Project Sustainability Plan

In the second year of the project implementation the process to transform the project into a formal institution will be initiated. It shall be registered as a social firm. Post two years of project implementation, the following activity verticals are identified for project sustainability and continuity in subsequent years (initial 2 years):

Running cost per Month

HEAD	Monthly Cost	Total
Assistance Network Engineer	10,000 x 2 Post = 20,000	20,000
Internet Bandwidth 20 Mbps (1:1)	45,000 x 1 Months = 45,000	45,000
Electricity	5,000 x 2 location x 1 months = 10,000	10,000
Office expense	2,000 x 1 Months = 2,000	2,000
Rent	3,000 x 1 Months = 3,000	3,000
GRAND TOTAL		**80,000**

Subscription fee per School/Client

HEAD	Client units per month
ISP Services	
Internet services for clients	Rs. 800/-

No. of Schools/Clients per month with increase of 10%

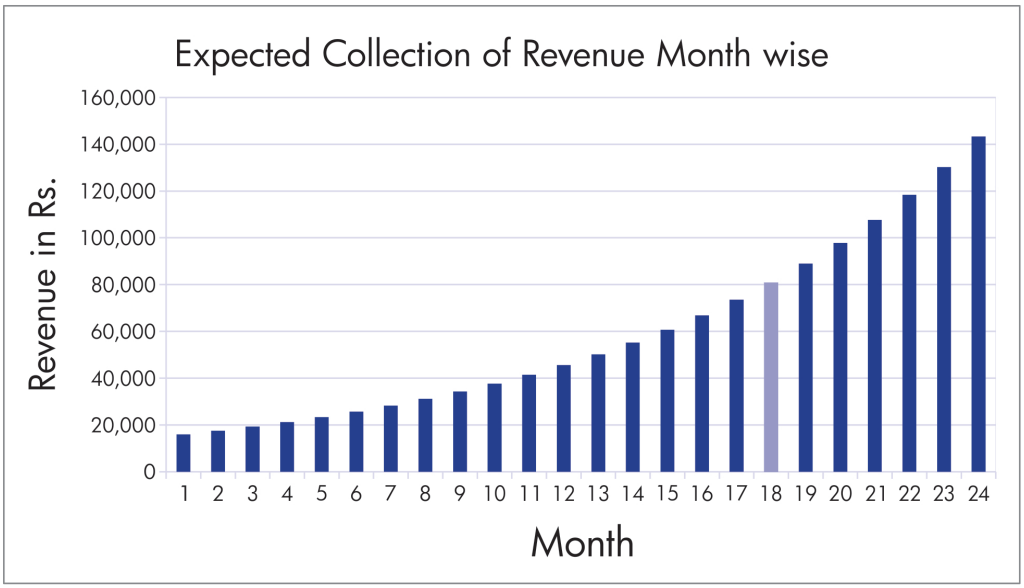
Month	Number of Internet services subscriptions
1st Month	20
2nd Month	22
3rd Month	24
4th Month	27
5th Month	29
6th Month	32
7th Month	35
8th Month	39
9th Month	43
10th Month	47
11th Month	52

12th Month	57
13th Month	63
14th Month	69
15th Month	76
16th Month	84
17th Month	92
18th Month	101
19th Month	111
20th Month	122
21st Month	135
22nd Month	148
23rd Month	163
24th Month	179

Expected collection of revenue per month

Month	Internet services (Rs.)	Total (Rs.)
1st Month	16,000	16,000
2nd Month	17,600	17,600
3rd Month	19,360	19,360
4th Month	21,296	21,296
5th Month	23,426	23,426
6th Month	25,768	25,768
7th Month	28,345	28,345
8th Month	31,179	31,179
9th Month	34,297	34,297
10th Month	37,727	37,727
11th Month	41,500	41,500
12th Month	45,650	45,650
13th Month	50,215	50,215
14th Month	55,236	55,236
15th Month	60,760	60,760
16th Month	66,836	66,836
17th Month	73,520	73,520
18th Month	80,872	80,872

19th Month	88,959	88,959
20th Month	97,855	97,855
21st Month	107,640	107,640
22nd Month	118,404	118,404
23rd Month	130,244	130,244
24th Month	143,269	143,269



Appendix A: Selected Photographs from Aizawl Field Study

Figure 8: Mizo High School with one of the best computer labs

Figure 9: Mizo High School - Smart Room for Computer-based Subject Teaching

Figure 10: LAN connection in a rural school

Figure 11: Computers damaged due to rains/damp being left unused and unrepaired in the computer lab

Appendix B: Survey Questionnaire

Guidelines for Survey Interview:

1. Please note that the questionnaire below is addressed to an individual respondent only.
2. Make sure that all answers are given by the respondent and nobody else on his/her behalf.
3. Note that interviews should not be conducted in groups.
4. Before starting the interview, introduce yourself and ask if the respondent is willing to spare half an hour for the survey. If not, request for another appointment at a suitable time.
5. All the * marked questions are compulsory. They HAVE to be answered.
6. Try to get clear responses. Avoid writing 'NA' for relevant questions. Find alternative ways to get the answer.
7. Make sure you are familiar with all questions in the survey before you conduct the survey

Section A - Interview Information

Date *	
Interviewer Name ? *	
Interview Duration (minutes) *	

SectionB-Respondent Information

Respondent Name *		
Mobile/Phone Number		
Email Address		
Gender *	Male	Female

Section C - Geographic Location

State Name *	Mizoram				
District Name *	Aizawl				
Block Name *	Aibawk	Darlawn	Phullen	Thingsulth-liah	Tlang-nuam
Address *					
Pincode *					
Take a picture of the house *					
Collect the GPS coordi-nates of the household	Latitude (x.y°)	Longitude (x.y°)	Altitude (m)	Accuracy (m)	

Section D - Survey Questionnaire

Respondent category *	School Mgmt.	School Teacher	Internet Service provider	Power Service Provider	Trainer/ ICT Expert	Tech. Support	Citizen	Tech./Edu. Expert (Qualitative)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Form C.1 - School/College Management

Section A -School/College Details

School/College Name *	
School/College Address *	
School/College Phone Number *	

Section B-Internet Connectivity/ Access

Is Internet facility available in the school/college? *				Yes				No					
If yes, then ask the following questions													
1	What kind of connectivity do you have?	Wired Broadband (Ethernet)		Wireless Broadband		Fibre		Leased Line		3G	Other (Please specify)		
2	Which Internet Service Provider do you use?	BSNL	SWAN (State Wide Area network)	Airtel	Vodafone	Reliance		Tata Indicom		Other (Please specify)			
3	Do you have a Local Area Network (LAN) setup?	Yes				No							
4	What is the average Internet speed in Mbps as per your Service plan? (Check here: http://www.speedtest.net/)	256 Kbps	512 Kbps	1 Mbps	2 Mbps	4 Mbps		10 Mbps		Other (Please specify)			
5	What kind of security measures do you use for the Internet? (Check box)	Firewall	Ati-virus software	Router password		Encryption (WEP, WPA)				Other	Don't know		
6	For how much duration is Internet available during working hours? (in hours)												
7	Is there a switch-on-switch-off option for Internet within the school/college?	Yes				No							
8	What kind of technical support does your ISP provide you? (Check box)	Quick	Slow	Competent		Incompetent				Other (Please specify)			

If no, then ask the following questions		
Do you think that Internet would benefit Education and School/College Operations?	Yes	No

Section C -Computer and peripheral hardware/software in School

If number of computers > 0, then ask following questions								
1	Do you have a Computer Lab in your school?	Yes						No
If no, then ask the following question								
1.1	Is separate space available in the school to create a Computer Lab?	Yes						No
1.1 a	If you answered Yes to the above question 1.1, please specify how many computers can fit into the lab	5	10	15	More than 15			
If yes, then ask the following question								
1.1	If yes, then how many computers do you have in the Lab?							
2	Are computers being used in classrooms for teaching lessons via projector?	Yes		No				
2.1	If no, is enough space available in classrooms to put up a computer, projector and projection screen?	Yes		No				
3	Which computer models are used in the school?	Manufacturer		Model Name				
4	What kind of Operating System is used?	Windows	Mac OS X	Linux	Other (Please specify)			
5	Do you have computers in the spaces mentioned here? (Check box)	Library	Teachers' room	Principal's room	Computer Room	Other (Please specify)		
6	If all students in one class are using the Computer Lab, what would be the Student to Computer ratio?	No. of students in one classroom				No. of computers in computer lab	Ratio (calculate automatically)	
7	What other supporting devices are available in the school for computer education? (check box)	Printers/ Scanners	Projectors	Television	Camera/Web Camera	Audio System (Mic, Speaker)	Tablets/ Mobile phones	Other (Please specify)
8	For what purpose are computers currently being used in the school? (check box)	Subject teaching (a)	Administrative Tasks (b)	Library Management (c)	Other(d)			

8.1	If you ticked option (a) above, then, for which subjects are computers used? (check box)	Maths	Science	Computer Education	Languages	Social Sciences	Other (Please specify)
9	For what purpose are mobile phones used by teachers? (check box)	Personal Communication	Searching Information	Educational Apps	Navigation (Using Maps)	Entertainment	Other (Please specify)

If there are no computers in school/college, then ask following questions								
1	Do you think computers can help in the teaching-learning process?	Yes			No			
2	For what purpose can computers be used on School? (checkbox	Preparing Lessons	School Admin Work	Giving Presentations	Homework submission	Online discussion and interactions	Online self-learning	Other (Please
3	How popular are computers in your school community?	Somewhat popular			Quite popular		Very popular	
4	For what purpose are mobile phones used by teachers?(-check box)	Personal Communication		Searching Information	Educational Apps	Navigation	Entertainment	Other (Please specify)

Section D – Power Supply

1	What is the duration (in hrs.) of electricity supply in school during 12 hours of school operation?		
2	Are there long power cuts during school hours?	Yes	No
3	Is the voltage supply for electricity consistent or fluctuating? Fluctuating	Consistent	
4	Does the school have power back up during power outages/failures?	Yes	No
4.1	If yes, then for how many hours does it last?		
5	Has earthing been done for the school building?	Yes	No
6	No. of plug-points in each classroom		
7	No. of plug-points in the Computer Lab		
8	Is there any provision for electrical expansion in school/college?	Yes	No

Section E – Technical Support Services

1	Do you have a provision for ongoing maintenance, new supplies, and technical support for computing devices?	Yes	No
1.1	If yes, is it enough to satisfy your current and future requirements?	Yes	No
2	Do you have onsite technical support to resolve critical issues?	Yes	No
3	Are you using any offsite technical support currently?	Yes	No

Section F – Additional Questions

Do you want to inform us about anything else?	

Form C.2 - School/College Teacher

Section A -School/College Details

School/College Name *	
School/College Address *	
School/College Phone Number *	

Section B-Knowledge of IT/Computers

Are you a computer/tablet/cellphone user? *	Yes	No

If yes, then ask the following questions						
1	Do you use a computer at home?		Yes		No	
1.1	What devices do you have at home? (checkbox)	Personal Computer (Desktop)	Laptop	Tablet	Mobile Phone	
1.2	For what purposes do you use them? (checkbox)	Checking emails	Social networking	Skype/ Video conversations	Work/ Study	Other (Please specify)
If no, then ask the next question						
1.1	Do you use a computer in other places? (checkbox)	School	Internet Café	"Relative/Friend's place"		
2	For how many number of hours do you use a computer during a day?					
3	Do you use a computer at school?	Yes	No			
If yes, then ask the next 3 questions						

3.1	For what purpose do you use a computer? (check box)	Preparing lessons	School Admin work	For giving presentations to students	For Homework submissions	For Discussions and online interactions	For online self-learning	Other (Please specify)
3.2	How has technology impacted the teaching process?	Negatively	Insignificantly	Positively	Very well			
3.3	How has technology impacted the learning process?	Negatively	Insignificantly	Positively	Very well			
4	Do you think technology can aid the teaching-learning process and have a positive impact on it?	Yes	No					
5	What can be the problems in computer-based learning in your school/ college? (check box)	Lack of knowledge in teachers	Lack of knowledge in students	Internet connectivity	Poor Hardware/ Software	Discontinuous Electric Supply	Lack of raining opportunities	Lack of acceptance	Other (Please specify)
6	Is Computer education or IT education a part of syllabus?	Yes	No					
7	Rate your classroom on an average based on students' knowledge of computers, Internet and technology	1 (Least Knowledge)	2	3	4	5 (Most knowledge)		
8	Do you have Internet at home?	Yes	No					
9	For how many number of hours do you use Internet during a day?							
10	Do you have any training in computer and Internet usage? (checkbox)	Yes, formal training	Yes, self-learned	No				
If yes, then ask the following 3 questions								

10.1	Please specify what kind of training have you had					
10.2	Do you perform following operations using the computer?	Using Word processor	Using a spreadsheet		Creating presentations	Browsing the Internet
10.3	Have you been trained to use Computers and Internet for Education?	Yes			No	
11	Do you have access to a Smartphone?	Yes			No	
If yes, then ask the following 2 questions						
11.1	What is the nearest access point you are able to use it? (Check box)	At home	Inside School	Outside School	While travelling	
11.2	Have you used a Smartphone for Education before? (check box)	To share content	To search for information	To use Educational Apps	To chat with students	Not used
12	Is there an Internet café near your school or home?	Yes			No	
13	Do students use Internet cafe	Yes			No	Don't Know
13.1	If yes, then for what purpose?	Studying	Surfing Net	Playing games	Chatting	Don't Know

If no, then ask the following questions				
1	Are you interested in learning computers?	Yes	No	
2	Do you think computers can help in the teaching-learning process?	Yes	No	
3	Do you think Smartphones are useful for Education at school/home?	Yes	No	
4	How popular are computers in your school community?	Somewhat popular	Quite popular	Very popular

Section C – Additional Questions

Do you want to inform us about anything else?	

Form C.3 - Internet Service Provider/ SWAN

Section A – Service Provider Details

Internet/Telecom Service Provider Organization Name*	
Internet/Telecom Service Provider Organization Address *	
Internet/Telecom Service Provider Organization Phone Number *	

Section B - Internet /Telecom Service - current and future

1	Do you provide service to any high schools or B.Ed. colleges in Aizawl district?	Yes				No		
1.1	If yes, then how many schools/colleges in total?							
2	Do you have any exclusive Internet plans for schools/colleges?	Yes				No		
2.1	If yes, then please give details							
2.2	If no, can you provide low-cost solutions for schools/colleges with seamless connectivity?	Yes				No		
3	What might be the issues in providing high quality Internet connectivity to schools/ colleges in Aizawl district? (check box)	Remote Location	Poor Electricity Supply	Less Manpower	Lack of Govt. Support	Lack of Technical Support	High Cost	Other (Please specify)
4	What kind of technical support do you provide for Internet installations in business/ school settings? (check box)	IT-level Web Support		Phone Support		Onsite support		Other (Please specify)
5	What are the challenges in providing T echnical Support to schools/colleges? (check box)	Lack of skilled local manpower		Budget Issues		Lack of training facilities		Other (Please specify)
6	Do you have any Internet connectivity expansion plans in Aizawl district in the next 1-2 years?	Yes				No		
6.1	If yes, please provide details							
7	Do you have WiFi hot spot services currently available in Aizawl district?	Yes				No		
7.1	If no, then is there a possibility of making these services available?	Yes, Immediately		In next 1-2 years		In next 5 years		No

Section C – Additional Questions

Do you want to inform us about anything else?	

Form C.4 - Power Service Provider

Section A – Power Provider Details

Power Service Provider Organization Name*	
Power Service Provider Organization Address *	
Power Service Provider Organization Phone Number *	

Section B - Internet /Telecom Service - current and future

1	Do you provide service to any high schools or B.Ed. colleges in Aizawl district?	Yes		No	
1.1	If yes, then how many schools/colleges in total?				
2	Are the power outages regular? (e.g. Every Wednesday, between 12-2 pm)	Yes		No	
3	Are there plans to reduce power outages in the next 1-2 years?	Yes		No	
3.1	If yes, please describe				
4	Do you have/Can you develop specific Power supply plans for schools/colleges?	Yes		No	
5	Are there any new projects in pipeline for Power Service Expansion in Aizawl district?	Yes		No	
5.1	If yes, then please provide details				
5.2	If no, then is there any such possibility in the future?	Immediate	In next 1-2 years	In next 5 years	After 5 years

Section C – Additional Questions

Do you want to inform us about anything else?	

Form C.5 - Information & Communication Technology (ICT) Trainers

Section A – Trainer - Experience and Interest

1	Are you a certified IT/Computer Skills trainer?	Yes			No			
2	Have you provided IT/Computer training to school staff/students in Aizawl district before?	Yes			No			
2.1	If yes, please specify where							
3	Are any training institutes present in Aizawl district for ICT/technology training?	Yes			No		Don't Know	
4	Are you interested in providing IT/ Computer training to schools in Aizawl district?	Yes			No			
	If yes, the ask the following questions							
4.1	What are your areas of expertise in basic IT training? (check box)	Basic computer literacy	Microsoft/ Other Office Software	Using Internet	Computer Security	Computer Maintenance	Advanced Topics	Other (Please specify)
4.2	Will you be able to develop short-term courses (1-2 months max) for teachers and students on the above topics?	Yes			No		Please give details	
4.3	Do you work as a Computer trainer in an institute, academy or university?	Yes			No			
4 .3a	If yes, how many trained IT experts might you have in your institute, academy or university?							
5	Will you be able to provide ongoing support as and when required?	Yes			No			
6	What challenges do you think you face to become an IT Trainer at a school/college in Aizawl? (check box)	Lack of time	Lack of relevant experience	No financial motivation	No benefits		Other (Please specify)	

Section C – Additional Questions

Do you want to inform us about anything else?	

Form C.6 - Technical Support Personnel

Section A – Technical Support Center Details

Technical Support Centre Name*	
Technical Support Centre Address *	
Technical Support Centre Phone Number *	

Section B – Technical Support

1	Does your Service Center provide technical support to the high school(s)/ B.Ed. college(s) in your area?	Yes			No			
2	How early can you provide technical assistance once the problem is notified?	Immediate	Within 1-2 days		Within a week		More than a week	
3	How much manpower do you have to cater to school(s)/college(s)?	None	< 5		< 10		> 10	
4	Which technical issues can be solved by School staff with basic training? (check box)	Security issues	Operating System problems	Slow computers/ downloads	Network issues	Printer problems	Software Applications problems	Other
5	Which technical issues can be solved only by Technical Experts? (check box)							

Section C – Additional Questions

Do you want to inform us about anything else?	

Form C.6 - General Citizen

Section A – Details of Citizen

Occupation Type*	Full-time professional	Part-time professional	Self-employed	Government job	Farmer	Labour	Unemployed	Other
Occupation Name*								
Education Level *	Illiterate	Upto Class 4	Upto Class 8	Class 10 complete		Class 12 complete	Post-Graduate	Above Post-Graduate

Section B – Internet Connectivity/ Access

1	Is Internet facility available in your home?				Yes		No	
1.1	If no, then why not?							
1.2	If yes, then ask following questions							
1.2A	What kind of connectivity do you have?		Wired Broadband (Ethernet)	Wireless Broadband	Fibre	3G	If other, please specify	
1.2B	Which Internet Service Provider do you use?	BSNL	SWAN (State Wide Area network)	Airtel	Vodafone	Reliance	Tata Indicom	Other
1.2C	What is the average Internet download speed in Mbps? (Check here: http://www.speedtest.net/)	256 Kbps	512 Kbps	1 Mbps	2 Mbps	4 Mbps	10 Mbps	Other
1.2D	For how much duration is Internet available at home? (in hours)							
1.2E	For how many number of hours do you use Internet during a day?							

Section C – Computing Devices/Internet Usage

Are you a computer/tablet/cellphone user?	Yes	No

If yes, the ask following questions						
1	In which places do you use computers? (check box)	Home	School	Internet Café	Relative/ Friend's place	Other
2	For how many number of hours do you use a computer during a day?					
3	For what purpose do you use a computer/laptop/ tablet? (check box)	Personal communication	Office work	Entertainment	Shopping	Other

4	Do you think computers and digital technology are useful for Education in school and home?	Yes	No
5	Is technology used at your home for Education and learning?	Yes	No
6	Will you support Internet-based online or offline learning in schools for your children?	Yes	No
7	Do you have Internet at home?	Yes	No
8	For how many number of hours do you use Internet during a day?		

If no, then ask following questions				
1	Are you interested in learning computers?	Yes	No	
2	Do you think computers are useful for Education at school and home?	Yes	No	
3	How popular are computers among your family/ friends/colleagues?	Somewhat popular	Quite popular	Very popular
4	Will you support Internet-based online or offline learning in schools for your children?	Yes	No	

Annexure C: Terms of Reference

Technical Infrastructure & Connectivity Feasibility Study- Aizawl District (Mizoram)

Introduction

The TATA-MIT Education Initiative aims at using contemporary educational technology affordances for High School Education and Teacher Education in India- to address the learning needs of students to better prepare them for active participation in higher learning and economic opportunity, to improve teacher education and transform their practice and to provide a platform for on-going research and innovation in education that will inform the field.

The initiative is timely and opportune in that it responds to the explosion in the need and demand for higher quality of education for a large student population entering into High School. It takes advantage of technological advances in devices, connectivity and innovation through a networked ecosystem which makes it possible to widen access to content and communities of learners leading to authentic and active learning opportunities at scale and to reach hitherto underserved communities through multiple Indian languages.

The proposed initiative seeks to directly engage with and alter the current situation of high schools in India by providing alternatives that will swing the balance decisively towards quality. The aim is to provide valuable learning opportunities at scale, that are capable of changing what our students and teachers know and can do using technologies, not as pipelines for the delivery of content, but to provide pathways to authentic learning and communities.

The TATA-MIT team plans to implement a scaled proof of concept in the following states: Rajasthan, Chhattisgarh and Mizoram. In order to understand the situation on the field with respect to technical infrastructure and connectivity status in high schools and B.Ed. colleges, the TATA-MIT team would like to commission a study in Aizawl district in the state of Mizoram to assess the connectivity and related infrastructure situation.

Objectives

The key objectives of the technical infrastructure and connectivity feasibility study are:

- To be able to select the high schools and B.Ed. colleges for intervention in Aizawl district in Mizoram using the field experience of the organization and utilizing the data collected through the study.
- To be able to estimate the type of infrastructural and hardware requirements that may be needed in addition to the infrastructure/hardware already present in the high schools and B.Ed. colleges in the district, thereby enabling the TATA-MIT team to design the offering.
- To understand the readiness and immediate future high-speed internet connectivity initiatives of the district/state for implementing a scaled technology-enabled education initiative.
- To understand the feasibility of wireless connectivity implementation, business and sustainability plan with scope of partners to collaborate.

ToRs for the Study

In order to select the high schools and B.Ed. colleges to implement the proof-of-concept in Aizawl district (Mizoram), the TATA-MIT Education Initiative would like to commission a study of the status of technical infrastructure (electricity and high-speed internet connectivity). Following are the Terms of Reference for the status study:

- To review the availability of technical infrastructure such as but not limited to electricity availability/problems, availability of plug points and presence of generator with diesel/fuel (power backup) in each of the 77 high schools (1 Central Govt., 66 State Govt., and 10 Private High Schools) and all the B.Ed. colleges in Aizawl District (Mizoram).

- To review and take stock of the ground status of (high-speed) internet connectivity and related infrastructure in each of the 77 high schools and B.Ed. colleges in the district. The review shall also indicate the likelihood of a school in the district to have a high-speed internet connection.

- To review and present the type of connectivity, the local providers/organisations/players in the field (including SWAN) and other such details to enable the MIT-TATA team to utilise the connectivity optimally for its implementation. Such a review shall also include the duration for which the connectivity is available and whether there is a switch on-switch off option within the schools.

- To review and present current and future large scale state (and other agencies) initiatives that may potentially enable the TATA-MIT team to forge long term partnerships. Such a review shall also include information on presence of institutions with high-speed internet connection (or net cafes) nearby the school.

- To review and present the presence of locally (school/area/block) available persons with good knowledge of Information Technology. The study shall report on the 77 community neighbourhoods in the 77 school locations and the technical support services available.

- To review the current PC/Laptop/Hardware and software usage in the 77 high schools and B.Ed. colleges and recommend hardware requirements at the school, teacher and student level to access good internet connectivity. The study shall also report on the content access and delivery through these devices and how it affects the teaching-learning processes and methods.

- To review and present teacher's access to computing devices and internet at their home and the access to smartphone by individual teachers and the nearest point they are able to use it.

- To recommend and propose solutions to the TATA-MIT Team for them to enable connectivity in schools/places with no internet connection with specific focus on how to enable wireless connectivity.

- To collate, compile and analyse the entire study data and present a report within 15 days of the completion of the study on the ground.
- To recommend high schools and B.Ed. colleges in the district in which the intervention can be done based on the quality of technical infrastructure present and the internet connectivity and related infrastructure available.

The study sample shall include 77 high schools, all B.Ed. colleges in the district, Internet/ telecom service providers, Trainers/tech experts, Power service providers, Citizen User respondents having experienced infrastructure & connectivity, and other ICT respondents like tech support, etc. Apart from the 77 high schools respondents, the study shall also involve qualitative responses from 150 people from the ICT and education sector in the district.

The TATA-MIT group may quote the study's results in research publications and/or other journals and magazines with prior agreement and with due credit and acknowledgment to the study partner(s). The TATA-MIT staff shall assist the study partner by making available secondary data where possible, sharing information collected through publicly available reports and data.

Proposed Outcomes

- Understanding of connectivity & access status in and around government high schools environment for planning and implementing the proposed TATA-MIT Education Initiative.
- Understanding of current ICTE provisions and status including content access, delivery, method, connectivity, power and plan for the proposed work.
- Understanding of local manpower and support services status for the above.
- Planning and implementing a connectivity and access plan with business and sustainability with potential partners like DEF.

STUDY
TATA-MIT Education Initiative