

Dear Sir,

Sub: Facilitating Village Panchayat to become OFC distribution agency and provide job opportunity to rural youth.

The importance of ICT has been greatly acknowledged for keeping India on the forefront of this sector. Unfortunately the benefit of the same has not yet reached rural areas. In order to promote villages as Rural Business Hubs, it is important that they be given the benefits of ICT. This typically requires six steps out of which five steps are generally available through some providers in the country, and have been implemented in some areas by previous projects. But one crucial step, namely, high bandwidth connectivity, is not available to rural areas.

If this facility is made available, the rural areas will be in a position to come up as business hubs in a very short time. **The high bandwidth connectivity is generally available through optical fiber connectivity.**

The six steps required in this direction are:

1. Some big company **(A)** having national level optical fiber grid (OFG) such as GAIL, Railways, who own the main line provides branch lines to the village. This amounts to providing a pair of cables from the main line to a certain physical location called Junction at the village.
2. Another entity **(B)** provides optical fiber connectivity (OFC) from the Junction to different locations called the Terminal in the village. This can be used for a variety of applications by a variety of entrepreneurs.
3. At one such terminal, an e-Business Centre can be developed. This will require some agency **(C)** which will have to work as Internet Service Provider (ISP).
4. It will further require another agency **(D)**, preferably the managers of e-Business Centre, to provide for required machinery, building and other items suitable for a working place. This will be something similar to a cyber café but dedicated to business.
5. It will also require a fifth agency **(E)** to develop and provide for application software.
6. It will also require a small training program for the rural youth who will manage the e-Business Centre, so that they know how to effectively use the software.

As stated above, agencies are available to provide for step 1 and 3 to 6 but not for step 2 namely OFC connectivity. This proposal is to suggest the development of a village-wide OFC network as described in step 2 above in 4 villages adjoining Igatpuri on the Mumbai-Nashik highway as GAIL has a functioning optical fiber grid there. It will be necessary for GAIL to provide the pair of cable to each village upto the Junction whereas the village panchayat will own the further OFC from Junction to Terminals. The village panchayat will charge a commercial fee from every user of the Terminal. Typical Users of the Terminal Connectivity can be (a) managers of e-Business Centre (b) some Internet service provider (c) company providing basic telephony and a host of such other applications.

My role will be to provide necessary consultancy to the gram panchayat for erecting owning and managing the OFC junction and terminals. For this I am approaching you for the necessary support. I look forward to a chance of meeting you sometime between 20th to 30th Dec. to make a brief presentation. I can also help for developing steps 2 to 4 above, if so desired by you.

My proposal will be a permanent source of income for the village panchayat.

Looking forward for a favourable early reply.

Yours sincerely

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ENCLOSURES

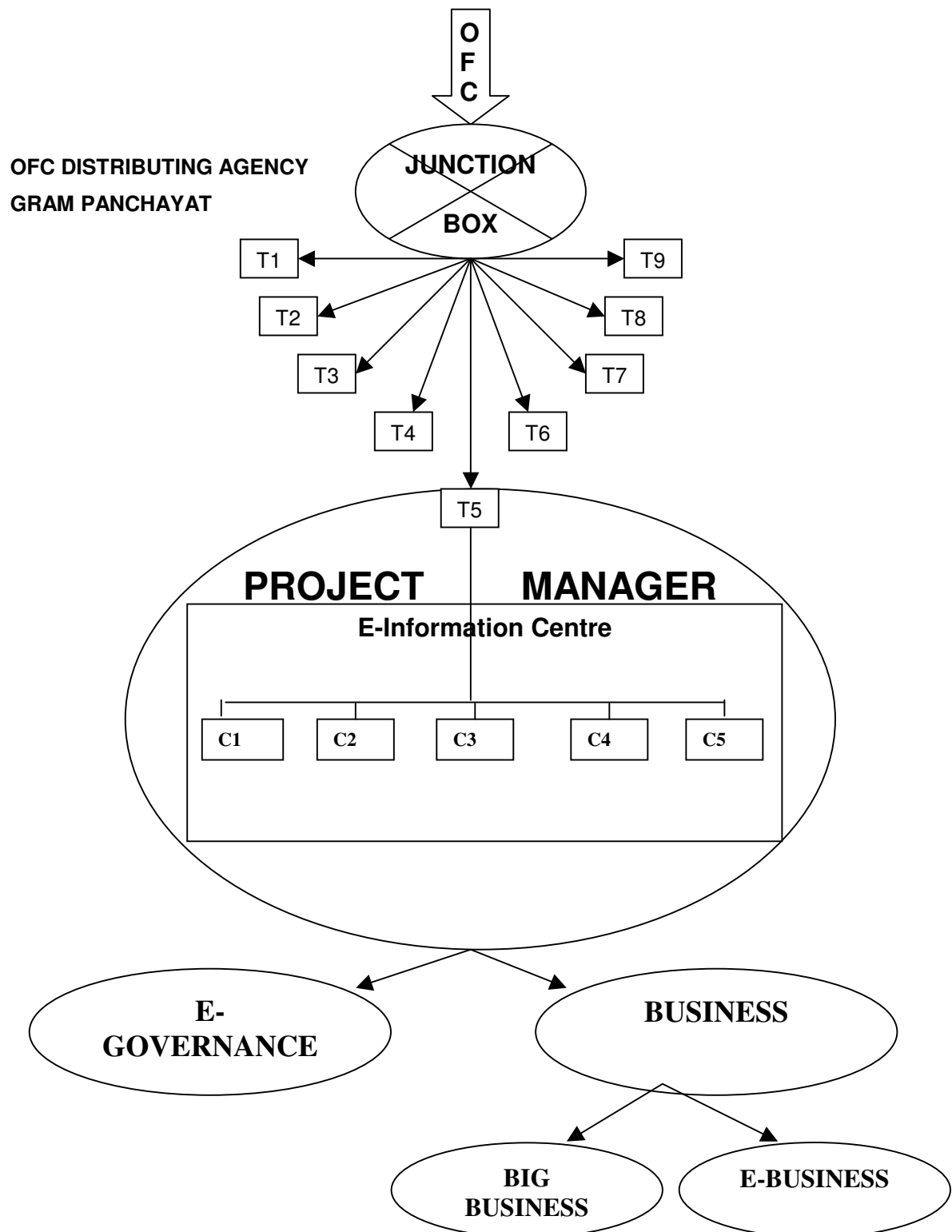
ANNEXURE-1: Schematic of OFC from GAIL line to Village and e-information centre

ANNEXURE-2: Details of modus operandi for development of rural business hub

ANNEXURE-3: Project cost per village

ANNEXURE-4: Network solutions (Wired, Wireless) for rural areas and its financial viability

SCHEMATIC OF OFC FROM GAIL LINE TO VILLAGE AND E-INFORMATION CENTRE



T1 to T5 are TERMINALS that could be used for multifarious purposes

C1 to C5 are computers housed in the e-information center

MODUS OPERANDI FOR DEVELOPMENT OF RURAL BUSINESS HUB

BACKGROUND

Providing access to information through ICT and thus strengthening business of the villagers at the grass root level by facilitating Gram-Panchayats to become Optic Fibre Cable (OFC) distributing agency that can be used for multipurpose utilities by willing and enterprising villagers to launch e-information center, ISP, Cyber cafés etc. at the village itself.

The rural areas when provided with useful information especially e-information can greatly benefit by ensuring small business propositions spurting up at the village level. This e-information center would be manned, operated and run by some trained youths of the village itself. Empowering villagers with e-information will facilitate and assist them to take appropriate decisions. Apart from the transformation of the village to a computer literate advanced and prosperous village, it would ensure its visibility in a Regional, National or Global market.

Some of the key benefits that will be achieved are:

- ✓ Improved access to information for villagers and systems in the villages
- ✓ Availability of internet access in schools to facilitate education
- ✓ Electronic libraries can be established
- ✓ Improved systems for e-governance
- ✓ Improved healthcare facilities (e.g. Tele-medicine)
- ✓ Fostering new business investment in villages
- ✓ Enabling telephony and internet providers a sound infrastructure
- ✓ Improving the economic conditions in villages

Today, access to information is largely limited to urban and a few or semi urban areas. Most of the semi-urban and rural areas have little or no access to information that can be beneficially utilized for business promotion. Women are most deprived and worst hit. Access to instantaneous information is mainly through traditional public telephone network.

The road map to provide the rural masses with latest, useful e-information that is usable, understood by masses for capacity building and assisting in taking business is detailed herewith at Annexure 1&2. The cost estimate for the development of e-information center is given at Annexure-3. Overview network solutions for rural areas and its financial viability is placed at Annexure-4. The project is split into two parts – Infrastructure, which deals with the network availability and Services, which deals with what will be provided on top of the network infrastructure.

Infrastructure

1. Network access to the village from the outside world. (The uplink)
This is usually achieved via a Microwave or Optic Fiber link from the nearest available service provider.
2. High Speed Network access within the village
This step is currently woefully inadequate, and one which I plan to address
3. Establishing a network access-node which people can come to and use
This is usually done, with a few PCs at the node, which people can use for email, internet, etc.

Services

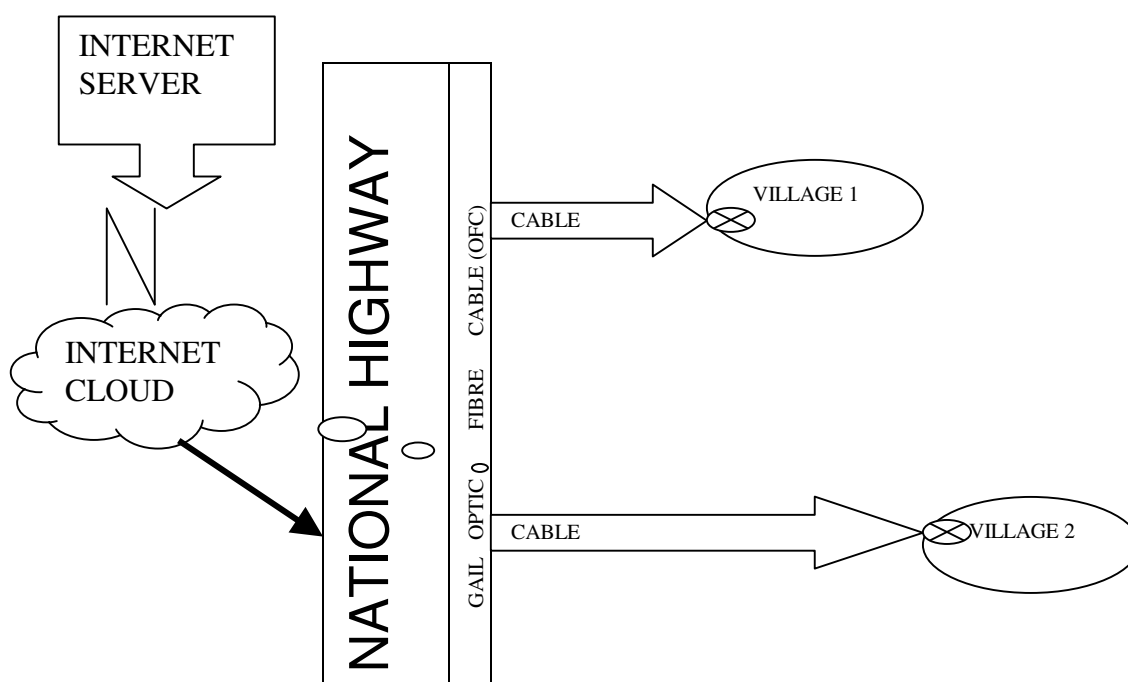
4. Providing Internet availability to the village network (or functioning as an ISP)
This is usually achieved via the uplink to the outside world
5. Software required to perform village-level activities (e.g. *Mandis*)
This is available in some access-nodes, and not available in other nodes.
6. Training the local people to perform the day-today maintenance tasks needed,

and how to handle network outages.

The source of Inspiration for the project is a successful working scheme at Stockholm. Incidentally, this is where I am pursuing my MS in computer Networking. A company called Stokab (<http://www.stokab.se/>) owns a private network of Optic Fibre Connectivity (OFC) and provides links to various locations in the city.

The clients of Stokab such as local telecom companies; Internet service providers, Universities and businesses can use this OFC system to build their own networks. Stokab does not provide any end use equipment. Clients can use the fibre in any way they see it useful. This approach doesn't restrict other users on the Stokab's network and makes available cheap and high-speed communications. The network infrastructure in Stockholm has flourished leading to creation of improved and special services like voice over IP telephony, a local internet exchange point for all operators to route their traffic etc.

PROPOSAL



An approach similar to the Stokab model but for a different purpose altogether can be implemented with ease in our Country. My presumption is based on the fact that all along the National Gas Grid, pipelines of oil companies & Railway lines an OFC has already been laid. GAIL's Mumbai – Nashik link has already become operational.

My proposal is as follows: The main OFC line along the highway will have tap off points near adjoining villages to provide access. From the tap off point another OFC or conductor will be laid up to the village (Choice is largely based on Traffic and distance).

The branch OFC line to the village terminates at a Junction Box located at a convenient place in the village. The Junction box houses multiple access line that can be distributed to the proposed e-business hub as per requirement.

After the OFC is provided up to the village a junction box will be placed for giving multi-utility options. The gram panchayat will be developed as an OFC distributing agency. The Gram Panchayat would release connections to any individual/ group desiring to set up or conduct business within the Gram Panchayat. Once the connection is available in the village there are a wide variety of ways the connection can be utilized viz. local telecom companies; Internet

service providers, e- information center, internet connection to schools and businesses. My proposal is basically aimed at setting up an e-information center.

The e-information center will provide a "one stop shop" for information, solutions and services. The e-information center will be a hub of 5 interconnected computers terminals that use the same kind of software that one finds on the public Internet, but it is only for use among the specified users. Each computer terminal will be manned by a unemployed youth who will be trained to facilitate access to information as required by the farmer beneficiary. For accessing information, the villager will pay a fixed amount that will go towards self-sustaining the project. 50% of the personnel manning the station would necessarily be unemployed women. The overall supervision of the e-information centre would be the responsibility of the project manager. Approximately around 200 sq. m space is required for housing the infrastructure.

When the information seeker requests for information in a specified form it is processed by a software or application program and sends back the information required. The system has to have interfaces with real time data entry updation for the system to be live. This would be something similar to the share prices software. The system would use a combination of text, graphics, audio, and video to provide information on most of the subjects imaginable.

The information that could be made available in the e-information center ranges from Land Holding pattern, Revenue records, Agriculture crop statistics, Prices of products at the nearest Agricultural Mandi and other bigger mandis, Agricultural Inputs, Implements new technologies and techniques, Banking, Trends of craft market, Agro processing, Dairy, Poultry, Piggery, Fishing. Health & Veterinary care, Water Shed Management etc.

In order to demonstrate the utility my role in the whole process could be to act as an external consultant to the panchayat to help them with establishing the network, training the people who will be in charge of operating the network, and overseeing the operation, for a total period of 6 months (initially). In addition, I will also study the uptake of technologies in villages, and viability of such a system if implemented in more villages, and report on the same. I am also willing to teach the students at the village schools regarding usage of computers and the Internet.

Initially I could provide guidance and consultancy to set up 4 e-information centers around Nashik and Thane district (adjoining Igatpuri etc.) along the Mumbai Nashik Highway. These model e-information centers would demonstrate the utility to other villages as well and the success of the project could be utilized for mass replication. I would look upon your support for all necessary approvals required from time to time from various agencies in making this project a real time success.

ANNEXURE- 3

PROJECT COST: COST PER VILLAGE

Set up per village for development of e-business hub (i.e. step 4 to 6) i.e. 5 computers, 5 trained village youth, one Project Manager, Infrastructure, Space development of application software, rent to the ISP provider etc.

Sl.	DESCRIPTION	AGENCY	COST (Rs.)
1.	National level optical fibre grid along the National Highway (Already existing)	A i.e. GAIL or Oil Companies – STEP 1	-Nil- (exists)
2.	Laying cost of cable/ metre including ducting etc @Rs. 200/ metre for 10 Km from the grid to the village. *Depending upon the terrain etc. cost would vary	A i.e. GAIL or Oil Companies or any other agency – STEP 1	200000
3.	Cost of laying OFC cable in the village including ducting etc, @Rs. 200/- per meter for about 15km in the village. (Note: this can be reduced by putting the OFC overhead)	B, i.e. Gram Panchayat – STEP 2	300000
4.	Cost of providing Internet Services i.e. ISP	C i.e any other private agency (in association with agency in Step 1) – STEP 3	100000
5.	Cost of establishing an e-business center ✓ Cost of five computers for e-information centre ✓ Other necessary hardware, Furniture etc ✓ Cost of Space for setting up e-information center* Requirement of space (100 sq.m) ✓ Land cost (Rental/month) ✓ Cost of maintenance per annum	D – first such setup cost should be borne by Gram Panchayat, beyond that other private parties are free to set up additional e-business centers	250000
6.	Providing guidance and consultancy ✓ Cost of developing application software ✓ Cost of training of youth (Project Manager and Terminal operator)	E i.e. Myself – STEP 5	200000
7.	Miscellaneous Incidentals		60000
	TOTAL		11,10,000

OVERVIEW NETWORK SOLUTIONS FOR RURAL AREAS AND ITS FINANCIAL VIABILITY

Possible Solutions

Below I have listed the existing solutions, with the positive and negative aspects of each solution

Wired

A wired network can either be in the form of a traditional Telephone network (PSTN) or as an Ethernet network, or an optic fiber network. The advantage of a PSTN network is that it may already exist (in the form of BSNL's telephone network). The disadvantages are many – low speeds (PSTN), excessive repeaters required (standard Ethernet is capable of cable-lengths of upto 100 meters only – which can be increased to 250m by decreasing the bandwidth available). This is not a future-resistant option, and hence will not be discussed at length. An optical-fiber based network is an attractive option, and is analyzed below.

Optical Fiber

Optical fiber cable (OFC) based networks are capable of very high data rates, and have a low cost per bandwidth ratio. Various innovative applications can be developed once a robust and high-speed network is in place – for example Cable TV over the network, or IP-Telephony.

Advantages

1. Can support high bandwidth (upto 10Gbps for specialized networks, upto 1Gbps for ordinary OFC networks)
2. Cost effective for price/bandwidth
3. Can cover long distances with relatively low power requirements (5-10 km segments without repeaters)
4. Ideal for rural areas where the population density is low and distances are large.

Disadvantages:

1. Initial cost can seem too high
2. The fiber itself is fragile and needs careful handling and specialized equipment at termination points
3. Will involve laying fiber, either underground (digging) or along poles (electricity poles can be used for this purpose)

Wireless

Wireless technologies are a viable solution in certain (restricted) areas, as discussed below. They have their own advantages and disadvantages, which we need to consider before deciding on a technology to be used for making rural areas network-aware. Wireless solutions have been effectively utilized to provide local network access (usually to a kiosk set up in a village), but these solutions have not addressed full-village connectivity.

A general concern with wireless technologies *may* be the effects of radiation, which have not been conclusively proven either way.

WiFi based systems

Wifi is a name collectively given to a set of open standards for wireless networking. These are the 802.11a,b,g networks, of which 802.11b is the most prevalent standard today. The standard specifies 11 Mbps for 802.11b and 54 Mbps for 802.11g, both operating on the 2.4 Ghz wireless spectrum.

WLL / CDMA based systems

WLL or CDMA based systems are more robust than WiFi based systems when it comes to interference, but they suffer from low bandwidth (64 or 128 Kbps against 11 Mbps with 802.11b or 1Gbps with Fiber). Another problem with WLL systems is that they are not extremely common for networking use, and therefore more expensive compared to WiFi systems.

Advantages:

1. WiFi is Standard off-the-shelf equipment, therefore lower costs
2. WLL / CDMA is inherently interference resistant
3. Open and well-documented standard, therefore no chance of vendor-lockin
4. Operates in the unlicensed 2.4GHz ISM band, therefore no spectrum licensing fees should be needed

Disadvantages:

1. Lower total speed , and speed reduces with increasing number of users.
2. Interference from other devices can seriously hamper bandwidth
3. Lower distance – can effectively cover only ~100-500 meters from the tower location
4. Requires a tower to be built and maintained (UPS / Generator backup, etc including wireless equipment)
5. Network connectivity depends on a large number of factors (Interference, distance from tower, line-of sight, vegetation, etc)
6. Requires permission from the Wireless Planning Commission (WPC) before deployment

Optimal solution

The optimal solution for an area-wide network is to use Optic Fiber cables, due to their long-distance and high bandwidth capability.

Cost analysis of the OFC network

The costs in a village-wide OFC network can be split up as below:

1. Cost of the fiber itself (per km)
2. Cost of laying the fiber – Underground (per km)
3. Cost of laying the fiber – overhead (per km)
4. Network operation equipment
5. Client side equipment (per client)

Services provided on the network

To recover the costs of laying out the network, the following (paid) services can be run, either by the network operator or by a third-party:

1. IP Telephony
2. Television over IP (IPTV)
3. Leasing out fiber to private companies (e.g. Cellphone companies) who need dedicated end-to-end fiber connectivity
4. and many many more ...