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Bridging the Digital Infrastructure gap in Rural India – "Last Mile-as-Managed Service"

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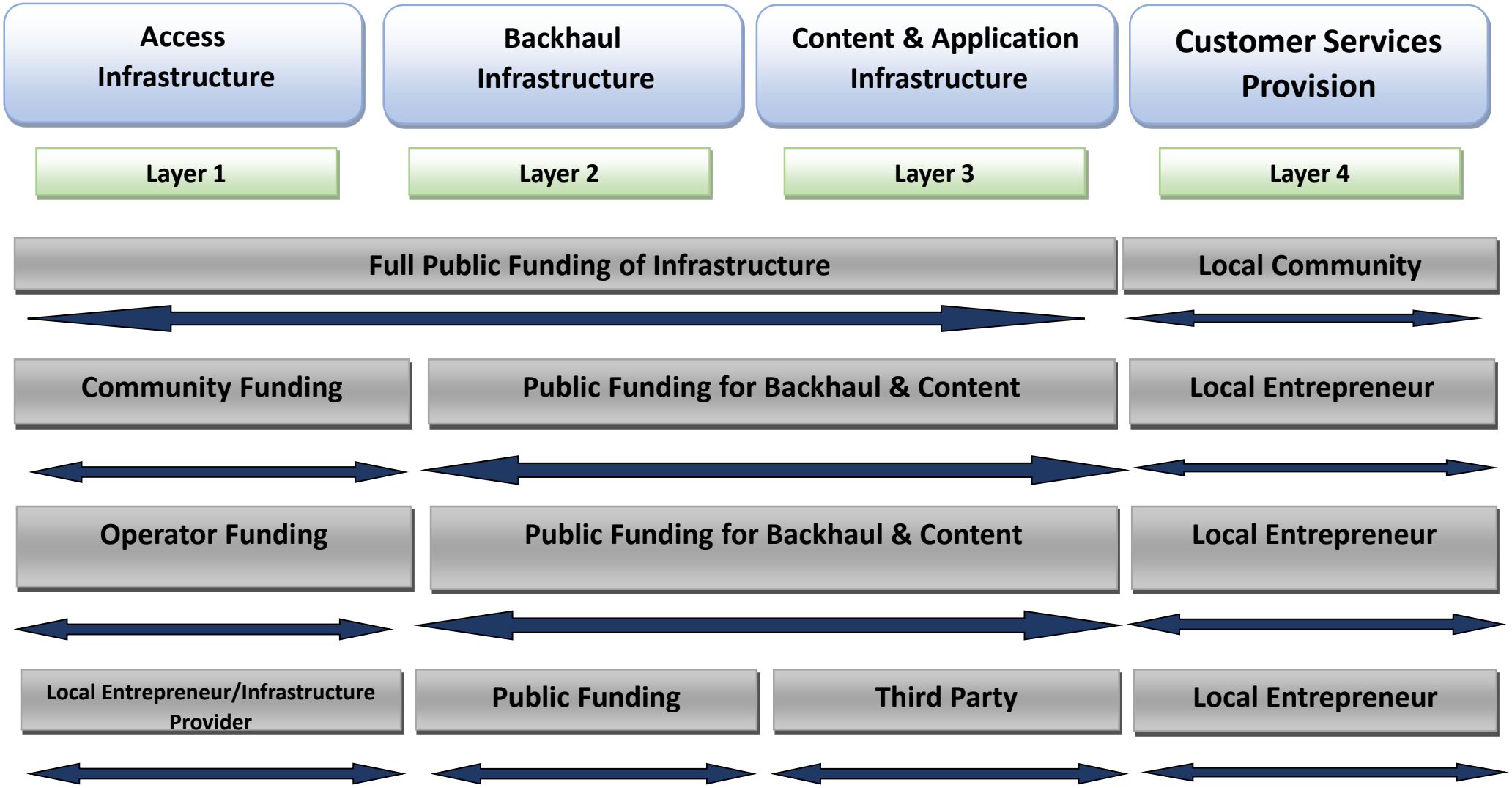
Implementable and Cost-Effective Solution for Rural Broadband Access

- **For successful deployment of the Broadband in the rural areas it is necessary for the respective government agencies/public institutions/Telecom Service Providers to provide the existing backhaul infrastructure at a subsidised cost on Revenue Share basis.**

- **For Broadband backbone network, optic fiber is the best and future proof solution with long term perspective. It needs to be funded by Government/USO agency and investment treated as sunk cost for the purpose of societal return on investment like any other national infrastructure such as highways, Railroads, Power and other public utilities.**

- **For the access network, it is advisable and cost effective to go for unlicensed spectrum based (Wi-Fi) Access solution with different Backhaul technologies depending upon the terrain, geography and existing infrastructure, availability of conventional telecom system and backbone network etc. This should generally be funded by the local service providers/third party independent infrastructure provider.**

Funding Options for Rural Broadband Infrastructure
(Based on Analogy from Alberto on Public-Private interplay)



Funding Options for Rural Broadband Infrastructure

i. **Full Public Funding:** The investment and the ownership of the network remains with Government/its agency, the design build and operate is generally outsourced to a non-government entity who has the expertise in implementing such projects.

ii. **Public Funding of Backhaul and Content, Community funding of Access Network:** Government and USO funding is limited to Backhaul and content infrastructure, which forms the major Capex, whereas the Access network is funded by the local bodies and community from their sources.

iii. **Public Private Partnership (PPP)- Backhaul and Content Public Funded, Access Network Private Funded:** Backhaul infrastructure is funded by Government/USO/ Public Sector, the Access Network is funded by the service provider/operators themselves. The VLE is employed as the franchisee of the service providers to manage the customer service provision.

iv. **Public Private Partnership (PPP)- Backhaul Public Funded, Content and Access Private Funded:** This is emerging model in cases where operators have no interest in any investment but there are 3rd party entrepreneurs, who are willing to invest and manage the access network and service provision.

Suitability Of Technology Options for Rural Broadband Access

Technology Options / Local Conditions	Distributed wireless based Backhaul + Wi-Fi Access working on renewable energy	Distributed wireless based Backhaul +Wi-Fi Access + voice working on renewable energy	Satellite Backhaul + Wi-Fi based Broadband Access working on renewable energy	Wireless Broadband Access through telecom network using TV set as Access device	Wi-Fi based Broadband Access with fiber Backhaul
Rural and Remote areas with no grid supply and no telecom network	Yes Good for low OPEX and CAPEX	Yes Good for low OPEX and CAPEX	Yes Good for high OPEX and low CAPEX	NA	NA
Rural and Remote areas with no reliable grid supply but with mobile network	Yes Good for low OPEX and CAPEX	NA	Yes Good for high OPEX and CAPEX	NA	NA
Rural and Remote areas with no grid supply but with fiber Backhaul	Yes Good for low OPEX and CAPEX	Yes	NA	NA	Yes
Rural and remote area with grid power and mobile network	NA	NA	NA	Yes Ideal for TV owning households	Yes

Business Model Canvas- Managed Rural Broadband Service Provider

Key Partners

- PSU Telcos
- Private Companies
- ISPs/TSPs
- Social Networking/ Content companies
- Investors, VCs
- NGOs
- Academic Institutions
- System Integrators

Key Activities

- Local Manufacturing & Sourcing
- Alliances & Partnership formation
- Proposal & Responses to EOI/ Tenders
- Sales & Promotions

Key Resources

- Investors & Venture funding
- Proven Technical Solution
- Innovative Business Model
- Passionate Management

Value Proposition

- Low cost, Low power & Low maintenance (3L)
- High QOS & Coverage
- Multi-faced system
- Rugged, Rural, Outdoor fit
- Open platform (Standard Wi-Fi APs)
- Environment friendly green-solution DG-less)
- End-to-End IP platform
- Cloud server for localized content

Customer Relationships

- 24*7 Customer Care Centre
- Micro Operators/ VLEs
- Regional Sales Executives

Channels

- Micro Operators/ VLEs
- Co-branded outlets
- Partnership Telcos/ISPs
- CSC (Common Services Centers)
- Direct Sales

Customer Segments

- Rural Retail Market
- Govt. users in villages
- Institutional users
- SOHO (Small Office Home Office)

Cost Structure

- Manufacturing & Sourcing
- Wi-Fi hotspot integration, funding, deployment, operation & maintenance
- Employees & office
- R&D & Training
- Sales & Marketing

Revenue Streams

- Sales of Prepaid Vouchers to retail customers
- Content/ Application services revenue share
- Postpaid Connections to institutions/ SOHO
- Govt. Anchor usage payments receipts
- Mobile Data offload revenues

Business Model for Rural Broadband Access - Managed Hotspot Service Provider

- For provisioning of Broadband in such rural areas a MHSP in partnership with Telco/ISP, installs a 5-meter-high pole/mast mounted microwave backhaul radio and Wi-Fi hotspot with solar panel and Li-Ion/SMF batteries along with BTS all in a box mounted on this mast.
- MHSP will appoint a Village Local Entrepreneur (VLE) from Local folks for managing Hotspot.
- This VLE will be given basic training by the MHSP for regular maintenance and operation of Hotspot infrastructure and to provide Wi-Fi of assisted Broadband services to the villagers.
- The VLE working as franchisee of MHSP, acts as single point of contact for all Broadband related products and services.
- VLE also takes the responsibility of digital literacy and assisted Broadband services (such as e-governance) to the rural masses.
- VLE will also use this WI-FI infrastructure for generating revenue through other activities (such as mobile charging providing rail-road ticketing, getting market prices of crops and assisting in doing business transactions, rural e-banking, help in getting medical facilities from urban health centers etc. to name a few).

Funding options for Managed Hotspot Service Provider (MHSP)

1. **MHSP funded through Managed Services (CAPEX)/Revenue share (OPEX) route**

2. **Investment by VLE through Micro-Financing/ Startup Fund**

3. **Subsidy by Government/ Local bodies Contribution/ Direct benefit to users through USO fund, Guaranteed Revenue by the Anchor Users (Govt.)**

Key benefits of MHSP Business Model

MHSP

- To create a sustainable social business in PPP mode.
- To make use of existing underutilized infrastructure of Telcos.
- To innovate and deploy out of box low cost solutions in a business manner.
- To add value to stakeholders as well as society.

VLE

- Opportunity to become an Entrepreneur.
- Contributing to the village community for improving the quality of life, in addition to generate employment and livelihood for self.

Village People

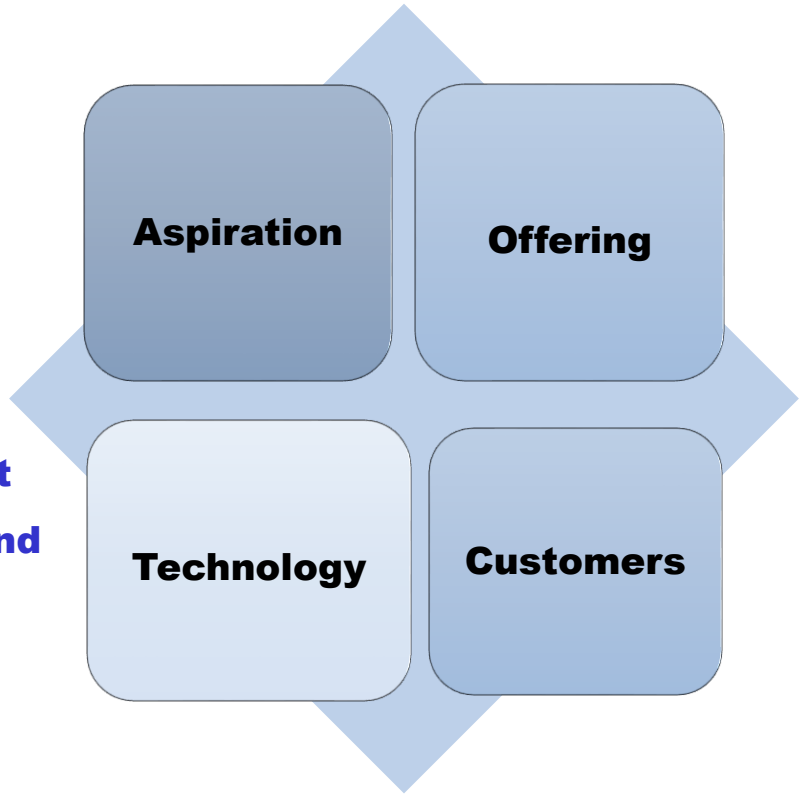
- Assisted Broadband services at doorstep/hands.
- 24/7 connectivity to the Internet.
- Improved productivity, efficiency and life style enhancement.

Why Wi-Fi? : A Killer Technology for ‘Last Mile Broadband Access’

1. Ubiquitous – Each smart device (including Mobile Phones) is Wi-Fi enabled.
2. Uses unlicensed spectrum *(ISM Band)* which is free **(750 MHz in 2.4GHz and 5GHz Band).**
3. All IP Technology which is very efficient and future proof which is based on open and ever evolving standards of IEEE (802.11x).
4. **Plug-n-Play ecosystem.**
5. Low Power consuming and Low Cost – overall infra cost about 10% of licensed mobile infrastructure.
6. Potential to conserve scarce licensed spectrum through Mobile Data Offload (MDO).
7. **NINENP (Non- Interfering, Non-Exclusive, Non-Protected) – Free for All.**
8. Current Hotspots in India – **3.75 Lakhs** (mushrooming everywhere).
9. Potential to deliver 4G and 5G type services through upgradation (802.11ac - Wave2, 802.11ax – Wi-Fi 6)
10. Ideal futuristic platform for IoT, M2M and E-health, E-farming, E-education.

BLUETOWN Rural Wi-Fi Initiative

To enable Broadband access to Rural India



Managed Hotspots at village level using innovative 5L technology (Low Cost, Low Power, Low Maintenance, Local Control, Local Content)

Access Infrastructure built using the License – Free Band available (2.4Ghz, 5 Ghz)

Telcos, ISPs, Local Govt. Bodies, through long term revenue share partnerships

100M+ subscribers across the world in next 5 years, 10,000 Managed Hotspots in Rural India

Bridging the Last Mile gap in PPP Mode – BLUETOWN as MHSP

- **BSNL, a govt. Telco in India have created 782 GSM (2G) sites in the un-connected areas of the state of Jharkhand.**

- **The State Government in line with the Digital India Mission decided to convert these 782 GSM sites into Wi-Fi hotspots for internet connectivity.**

- **State Government provided support in the form of "Viability Gap Funding" to support BSNL to convert these sites into Wi-Fi hotspots as a anchor beneficiary.**

- **BLUETOWN, a Danish technology startup partnered BSNL to execute, operate, manage and market the project as MHSP.**

Scope of the Project

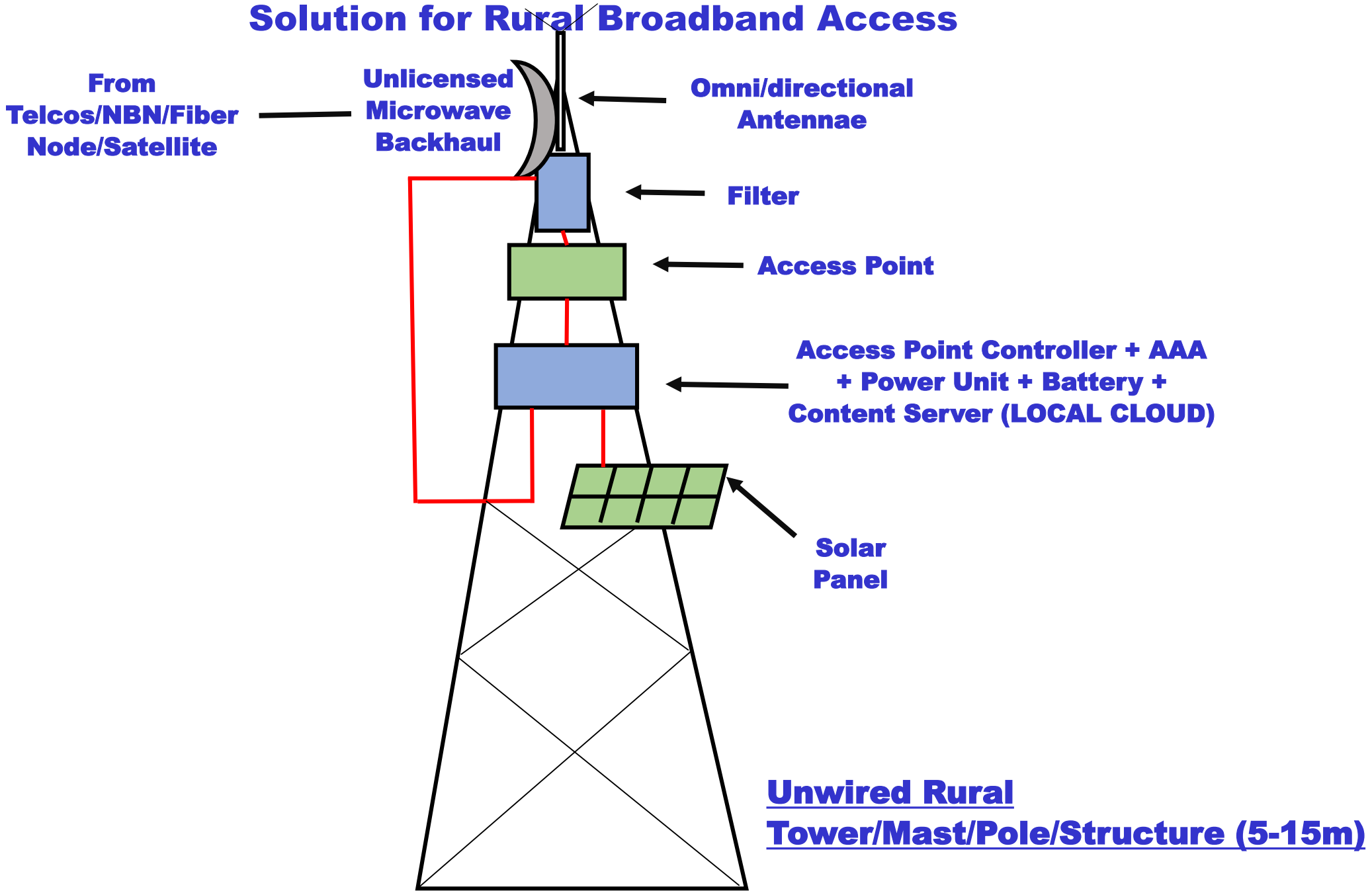
- Existing 2G sites converted to Wi-Fi hotspot by BLUETOWN
- 2 Mbps of Internet Leased Line provided at each site by BSNL
- 4 Access Points installed at each site
- Customized billing plan (as per the recommendation from state Government) for the end users offered
- Centralized Billing platform established
- 24x7 centralized Monitoring of the sites ongoing
- SLA Compliance as per the Govt. requirement

Wi-Fi Solution Deployed

BLUETOWN Outdoor Solution – Everything on Tower

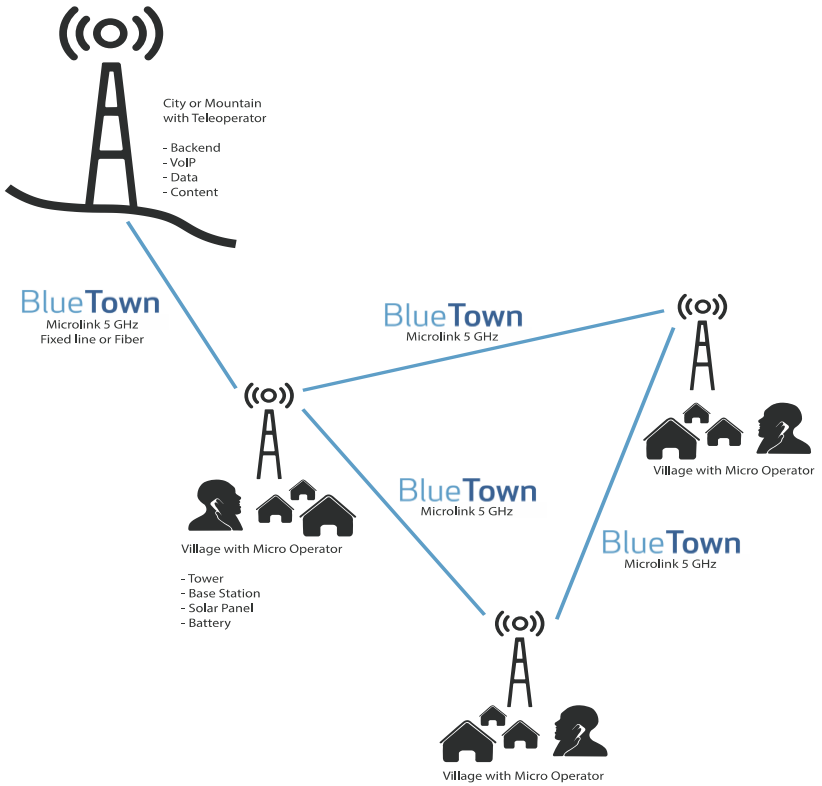
- **Access Point Controller (Housed in an IP67 weahter proof outdoor box)**
- **3 sector Antenna assembly located on BSNL existing Tower. This includes the following components**
  - **120 Degree Sector Antennae's (3 in Number)**
  - **Bandpass filters (3 in Number)**
  - **2.4 Ghz Access Points (3 in Number)**
  - **Backplates to support the Antennae assembly (3 in Number)**
  - **Antennae Mounts**
- **Solar Power system including the following**
  - **Solar Power Unit with Li-ion Batteries (Housed in an outdoor IP67 box)**
  - **Solar Panel**
  - **Solar Cables & Connectors**
- **4th Access Point with an OMNI/Sector Antennae (as per requirement) to be installed at a location upto 1 Kms (like a school, PHC or GP etc.) away from the tower**
- **Internet backhaul provided by BSNL**

EVERYTHING ON TOWER (EOT) - Innovative & Techno-feasible Connectivity Solution for Rural Broadband Access



BLUETOWN Wi-Fi Solution Salient Features

- **120 degrees sector antennae used to provide a 360 degree coverage**
- **Solution can be customized in terms of placement of the sectoral antennae and the additional access point**
- **Users connects to the BLUETOWN base station via Wi-Fi within up to 1 Kms in range (diameter)**
- **Users connects via traditional Wi-Fi enabled devices (handsets/tablets/laptops)**
- **Integrated SMF/Li-Ion battery based solar powered solution (35-40 Hours of Backup); more than 5 Years of Battery life**
- **BLUETOWN Wi-Fi AP Controller which is core of the solution is capable of handling:**
  - **AAA Authentication**
  - **Bandwidth Management & RF Control**
  - **Power Control & Battery Management**
  - **Remote Access for system maintenance**



Recommendations from India Case Study for MHSP

1. For Government & Public Agencies:

- Organise **"Funding and Build"** of National Broadband Network (NBN) to take the Broadband connectivity to rural and remote areas through infrastructure budget/USO funding.
- Provide the Backhaul connectivity to the Access Service Providers/VNOs/MHSPs in rural areas on Open Access basis at nominal Incremental charges, through revenue share.
- Provide **tax breaks/concessions incentives, subsidies for the MHSP** as well as Service Providers in rural areas.
- Establish the **'Content Delivery Network'** as a backend/ Cloud platform for the delivery of government services and applications to citizens.
- Provide **Affordability-Deficit-Funding (ADF)** as guaranteed revenue or financial incentive (benefit) for the procurement of Broadband access to public institutions and individuals in rural areas.
- Create a light-regulated class license (like the one recommended by regulator – PDOA/PDO) through registration process as is done for OSPs/VAS players.

Recommendations from India Case Study for MHSP Contd...

2. For Local Government Bodies:

- Provide free/low cost Access to real estate as well as **"Right of Way"** for creation of Broadband access network (Hotspots).
- Provide exemption/reduce levies for the local taxes including GST for the Broadband equipments and services in rural areas.
- Provide initial funding/grant to **Village Local Entrepreneurs(VLE)** to start Broadband services business and create awareness about Broadband services and applications among the masses.

3. For Regulatory Bodies:

- Facilitate **'Open Access', 'Wholesale Pricing'** and **'Infrastructure Sharing'** for the government/public sector owned facilities to enable the local **Internet Service Providers/ VNO's** to provide Broadband services fast and within affordable level.
- Permit franchising arrangements between the **'Operator'** and the **Local Entrepreneur (VLE)** and to create a **light-handed, "Class" license**/rural VNO category for niche rural areas by automatic registration process like **OSP (Other Service Providers)** without any conditions or obligations.
- Have **'Technology-neutral'** and **'Service-agnostic'** approach to enable the Players to innovate on the technology front to reduce costs.
- Make more spectrum **'license-exempt'** for use of Wi-Fi for Broadband access as well as **'Middle Mile'** in rural areas as done in India.

Recommendations from India Case Study for MHSP Contd...

4. For Operators & Service Providers:

- Partner with **Managed Hotspot Service Provider (MHSP)** to build access network in rural areas using innovative low cost solutions to run on revenue share basis.
- Provide interconnectivity to the “Class” licensed local access providers/VNO’s in rural areas on revenue share basis.

5. For MHSPs/Local Communities/NGOs:

- Bring awareness and provide training to the local masses to become digital-literate.
- Appoint and train the local entrepreneurs **(VLE)** to take up and manage the Broadband service provisioning.
- Facilitate initial funding for the business requirements of Local entrepreneurs **(VLE).**
- Help in identifying the **Local Content and Applications** requirements.

Thank You

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