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| **Title:** | Sharable Small Cells Access network Infrastructure for Rural Deployment |
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# Background:

FRN WG has already adopted a question for study on Sharable Femto cell infrastructure. The present contribution is an attempt to establish an improved definition of the sharable infrastructure with the visualized deployment needs, its associated business model and the technical requirements.

Mobile network based telephony services have made significant impact on the life of the people who were living without it earlier. Technological advances in the field of Telecom technology has provided enormous opportunity to fill the infrastructural gap to provide basic telecom services and the fundamental services like Health, Education, Banking, Governance etc all based on the adequate telecom infrastructure at all the places including under-privileged remote villages.

Current trend of providing telecom infrastructure in rural area is to provide Macro cell based cellular network starting from the city centre towards nearby villages and then remote villages. Cost of setting up telecom infrastructure and the cost to operate it in remote area increases significantly when you move away from the city centers, while the paying potential of the service users decreases. Beyond a point the setting up an economically viable telecom infrastructure comes under big question. There must be some way to increase the viability point 

Governments are making many attempts to extend the economic point to viability by investing hugely in setting up Optical Fibre based backhaul network in rural areas connecting all Gram Panchayats (25000 Villages).

Such efforts need to be supplemented by more innovative solutions utilizing recent advances in telecom technology, developed products, evolved new architecture and network mechanism supported by viable business models.

Following proposal is one attempt in this direction.

# Setting up Sharable Separate Small Cell Access Network Infrastructure

Post the development and the deployment of 3rd Generation Radio Access technologies, it has been widely recognized that the data-rate capabilities of any wireless technology in Macro deployment (large Cells) with high mobility is significantly different than the same in Micro/pico/Femto (Small Cells) deployments. The existing TSPs, as per the licensing and service obligation conditions, need to plan Wide Area (Large Cell) deployment with high mobility which can be supported by small cells concentrations whenever required for additional high data rates with low mobility. The cost of deployment and the economic viabilities in rural deployment perspective has its own challenges and will restrict is speed of roll out.

Setting up a Sharable (among all TSPs) Broadband Wireless Small Cells Access Network in rural areas can reduce the overall cost of the infrastructure and will add to speed of roll out. The Small cell Access Network would be sufficient for delivering all Broadband based fundamental services at a much reduced cost. It is proposed to initiate study under GISFI FRN explore new Architectural, Regulatory and the required Business Models to establish Technical and Business feasibility of such concepts. Once evolved, these requirements will also be an important set of inputs to the other Global Standardization organizations and the Research Institutions.



**Key Considerations**

1. Rural Broadband Small Cell Provider (RBSP) shall be allowed to set up only Small Cells infrastructure with limited radiated power.
2. The Small cell could be overlapping to each other of totally disjoint.
3. In case they are overlapped, smooth handover should be supported.
4. Small Cell network will have Roaming Agreement with the existing TSP. TSPs could be Cellular TSP (MNO) or the fixed line or Broadband Wireless Access (BWA) provider licensed as ISP.
5. RBSP can take backhaul from any available one or more TSP or National Optical Fibre Network directly.
6. There must be smooth handover between exiting MNO’s Macro network and the RBSP access whenever there is coverage overlap.
7. RBSP will have their own subscriber base and will act at Rural MVNO under the current regulatory provisions.
8. RBSP should be Technology agnostic. All existing (Wide Area and Local Area wireless access technologies) and evolving (Beyond 4G) wireless technologies should be allowed be used.
9. Large deployment scenarios as RBSP in rural India will provide firm user requirements to the “Beyond 4G “ Technology development and Standardization and product development organizations worldwide with respect to cost, datarate, frequency of operations, and suitability to the rural environmental challenges.
10. The entire Small Cell infrastructure is expected to be developed in such a fashion that the same can be easily installed, operated and maintained by local skilled people at the village level.
11. The operating business model will provide opportunity for the development of village level telecom infrastructure entrepreneur associated with Gram panachayat It could provide a new model of Private-Public Partnership at Village (Gram Panchayat), Block or District level.
12. Small portion of Spectrum suitable for various existing wireless technology is required to be granted separately for village level operations.
13. RBSP may be provided Spectrum and the backhaul connectivity from national telecom infrastructure free and can be expected to provide all communications from Consumer to Government as free. It will also be expected to provide telecom access to all services based on Broadband infrastructure as free.
14. RBSP infrastructure will also be used for commercial applications and will also generate revenue.
15. Subscribers utilizing RBSP Infrastructure should be linked to UID program for Authentic transactions and for record.

# Proposal

1. It is proposed that the FRN WG Question on “Femto Cell Sharing “ be redefined based on these preliminary inputs.
2. A suitable technical architecture for interworking of Sharable Rural Broadband Wireless Small Cell Provide (RBSP) infrastructure with mobile and the fixed line networks supporting all the prevailing radio network technology and the architectures.
3. All efficient mechanism for supporting seamless handovers between service continuity without any compromise on the security aspect on the boundary of RBSP and MNOs/Fixed TSPs network must be evolved during this Standardization exercise.
4. Specific studies should be conducted to provide guideline to the users on technology selection criteria and other deployment related aspect for setting up RBSP ‘s small cell infrastructure as part of this exercise.
5. Exiting MVNO regulatory provisions should be studied for the purpose of setting up and suitable Architecture (Technical) Rural MVNO with having its own Small Cell infrastructure. Any limitations found in MVNO regulatory norms should be presented to TRAI for suitable incorporation of the suggested changes.
6. Suitable Business Model should be evolved under this mandate for setting up Sharable Rural Broadband Small Cell Provider. This is urgently required to provide cost effective, in-time and suitable telecom infrastructure for enabling Broadband based Fundamental services as Health, education, banking, Governance etc to the rural citizens to meet their fundamental needs.