



technology. Cellular technology is going through constant technology evolution (2G, 3G, 4G, 5G) etc. and adoption of a specific cellular technology may result in significant sunk costs, going forward, owing to obsolescence. On the other hand, RF-Mesh, with its multiple possible communication 'pathways', is a superior technology from communication point of view as in this case the distribution licensees are fully in control over the mitigation of issues encountered. However, RF-Mesh technology requires upfront capital expenditure in providing for the communication canopy across the entire licensed area/ targeted demarcated area. Therefore, for carpet deployment, RF-Mesh is the preferred option as all benefits of smart metering pertaining to one demarcated area can be better achieved under this option.

2.15 In the above backdrop, the Petitioner herein foresees two scenarios, namely, (i) installation of smart metering only for new installations and defective meter replacement and (ii) smart metering for entire meter population. Detailed CAPEX and OPEX for cellular smart metering technology and RF mesh technology and status report on smart meter pilot project are submitted with the application.

2.16 **Smart metering only for new installations and defective meter replacement only:**

2.16.1 If smart meters are deployed only for new connections and against defective meter replacement cases, these meters would have to be installed across the entire licensed area in a widely scattered manner. This can be achieved with cellular smart meters. Incremental capital expenditure (CAPEX) for installation of smart meters in place of vanilla static meters, for such deployment, would be Rs. 60 Crores per year, only for new connections and replacement of defective meters. There will be an additional operational expenditure (OPEX) for Software as a Service (SaaS) costs, SIM rental costs and data storage costs, which would amount to around Rs. 14 Crores in the first year. Yearly OPEX for each subsequent year would, however, depend on the cumulative meter installations up to that year at the same going rate.

2.16.2 However, the following concerns prevail with respect to cellular based communication for smart metering:

- i) The communication technology over 2G shall inevitably be phased out in the near future and therefore selection of this technology may be a risky proposition in the long run. Incidentally, 3G is already phased out.





- ii) The other emerging cellular technologies like NB-IoT for communication with smart sensors / meters need to be evaluated thoroughly to check whether the technology is capable enough to fulfil all the requirements / use cases / functionalities of Advanced Metering Infrastructure (AMI), including remote firmware upgrades in bulk and the availability of the network at every nook and corner. Further, as of now, only one communication solution provider is operating in India currently for NB-IoT, which may be a point of concern, both from technical and commercial point of view.
  - iii) 4G, as an AMI solution, has very few proponents in India currently, especially amongst the meter manufacturers, owing primarily to high meter costs.
  - iv) Reading success of 2G based smart metering systems, currently installed across licensed area, generally varies around 90%, owing to the absence of proper mobile network signal strength. Reading collection has to be done manually in cases where the meters cannot be read remotely. Blanket deployment of cellular based smart meters therefore would be practically challenging from the point of view of managing and collecting physical readings from around 10% of the entire consumer base spread across the entire licensed area.
- 2.16.3 On the other hand, RF-Mesh technology, when used for last mile communication, is mostly suitable for carpet deployment and would require the installation/erection of the RF-Mesh Communication Canopy prior to installation of smart meters.
- 2.17 **Smart metering for entire meter population**
- 2.17.1 If the existing meters for the entire 34 lakh consumers of the Petitioner are to be replaced by smart pre-payment meters, RF-Mesh technology is more suited and would require erection of communication canopy upfront. Considering all practicalities, the same will be a daunting task, even if for the sake of argument capital resource is not considered as a constraint. If, however, the entire activity is to be carried out, the CAPEX will be around Rs. 1,615 Crores for a population of 34 lakh consumers which includes costs of smart meters and communication network devices to complete the job in at least 5 years' time with all other resources at disposal. There will be a significant tariff impact under this scenario.





- 2.17.2 Replacement of all post-paid meters would practically involve many other associated activities including and not limited to evaluation of meters, Head End Systems (HES)/ Meter Data Management System (MDMS), integration of the legacy reading collection/ billing systems with the HES/MDMS, revamping data storage systems, building IT infrastructures, integration of meters with communication modules if the meters and communication modules are of different makes, etc. This is in addition to the physical activities that would also need to be carried out, like replacement/renovation of meter boards wherever required in order to accommodate smart meters in the same meter board. Further in case of RF-Mesh deployment, additional activities like network surveys, network planning, installation of network devices along with necessary provision for power supply, earthing and fencing would also have to be carried out. Considering all practicalities, replacement of all existing post-paid meters within anything less than 5 years is a daunting task considering scale of operations, even if provisioning of capital resource is not considered as an impediment.
- 2.17.3 Additionally, there are associated OPEX covering installation, software setup costs and Software as a Service (SaaS) costs for Head End System, etc. amounting to a total cost of around Rs. 515 Crores in 5 years. Therefore, the total outgo is around Rs. 2,130 Crores considering both CAPEX and OPEX. The cost per end-point (meter) for the entire 5-year period is around Rs. 6,265. Beyond the project period, recurring OPEX at Rs. 15 per end-point per month would continue. However, for RF-Mesh technology, regular OPEX in SIM rental costs etc. can be avoided.
- 2.18 Additional costs for Meter Data Management System (MDMS), system integration and associated software would have to be considered separately for both the above scenarios.
- 2.19 Deployment of smart meter at a mass scale, therefore, will cause financial burden on consumers of the Petitioner without matching benefits. It is respectfully stated that the Government of India, through its various policies, has been focusing on improvement of AT&C losses of distribution licensees, particularly whose loss figures are above a certain level. This may be considered as a useful benchmark for taking any decision or action regarding metering, as there will be major cost implications that will ultimately have to be borne by the consumers. Thus, the objective of installation of smart pre-payment meters needs to be evaluated on the basis of cost benefit analysis.





- 2.20 It is worthwhile to mention that the deployment of smart pre-payment / pre-payment metering is generally intended to improve billing / collection efficiency of the licensees. However, certain distribution licensees like CESC have already made considerable progress towards improving billing / collection efficiency through sustained initiatives and therefore the potential for further improvement might not be commensurate with costs incurred.
- 2.21 **Pre-payment Meters**
- 2.21.1 Standalone pre-payment meters carry many inherent design limitations and if deployed, these meters will make it difficult for the licensee to carry out many important activities such as consumer specific energy accounting and energy auditing functions.
- 2.21.2 Considering all practicalities, effecting tariff changes in the installed standalone pre-payment meters, estimation of available balance in case of two-part tariff with rebate / surcharge mechanisms, adjustment of meter balance post burnt / defective replacement of meters, remote surveillance, net metering functionality etc. would continue to be very difficult. The existing basic / stand-alone pre-payment meters shall also not be able to meet other future needs of the distribution licensees.
- 2.21.3 Pre-payment feature is not applicable for external CT or CT and PT operated meters as these meters do not possess in-built connection / disconnection switches.
- 2.21.4 Annexure – C2 of West Bengal Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2011 providing for 'TARIFF SCHEME FOR DIFFERENT CLASSES OF CONSUMERS' allows Prepaid Tariff under 'Optional Tariff Scheme' for certain categories of LT consumers.
- 2.22 **Smart meters:**
- 2.22.1 Smart metering eco-system not only comprises the smart meters, but also encompasses the remote communication infrastructure / network and back-end software system (Head End System), Meter Data Management System (MDMS) and Data Storage. Smart pre-payment meters are essentially smart meters, where the pre-payment functionalities shall reside at the back-end server. Pre-payment functionality shall be achieved through integrating suitable software application with Head-end system or Meter Data Management System, which will communicate and control the field smart meters, at preconfigured intervals.