

VOLUME-I: SECTION – VII

SCOPE OF WORKS

Engineering, Design, Supply, Installation, Integration, Commissioning, Operation and 5 years Maintenance/FMS Support of Advanced Metering Infrastructure (AMI) Solution for 2.0 Lakh (1 Lakh in Jammu City + 1 Lakh in Srinagar City) Smart Electricity Meters with Communication Module for Power Development Department (PDD) of Government of J&K under Prime Minister's Development Package (PMDP)

1. About The Project

RECPDCL envisages engaging an AMI Implementing Agency (AIA) with sufficient experience, technical competence & expertise, financial strength and related infrastructure facilities for carrying out engineering, design, supply, replacement/installation, commissioning, integration, operation and 5 years maintenance/FMS support of Advanced metering infrastructure (AMI) solution for 2.0 lakh smart electricity meters with communication module for power development department (PDD) of government of J&K under prime minister's development package (PMDP) along with all associated accessories on turnkey basis in Jammu & Srinagar City (**1 Lakh each in Jammu City and Srinagar City**) of Jammu & Kashmir including O&M services of metering infrastructure for a period of five years.

The broad scope of work is as follows:

- 1) Supply, installation, testing, commissioning for 2 Lakh Smart Meters (1 Lakh in Jammu City and 1 Lakh in Srinagar City) with net-metering, credit & pre-paid functionality with warranty and O&M/FMS period of 5 years post complete Go-Live of Project.
- 2) Supply, installation, testing, commissioning of communication infrastructure based on RF network for complete Geographical area of Jammu City and Srinagar City with consumer base of 2 Lakh Smart Meters (1 Lakh in Jammu City and 1 Lakh in Srinagar City) with warranty and O&M/FMS period of 5 years post complete Go-Live of Project.
- 3) Engineering, design, supply, replacement, commissioning, Integration along with warranty and O&M/FMS for 5 years of Back-end IT infrastructure for 2.0 Lakh scalable upto 20 Lakhs consumers including Unified-HES, upgradation of existing MDMS and all necessary hardware and applications along with interoperability and integration with all existing applications of JKPDD.

As the work shall be executed on turnkey basis, all the associated materials shall be procured & maintained by the contractor as per the provision of tender. All the facilities required to execute the work properly shall be engaged by the contractor without any extra cost implication to RECPDCL. The contractor shall also do filed survey on the basis of data/list provided by RECPDCL and prepare the BOQ/BOM and get it approved from RECPDCL.

2. Project Area

The Project Areas for deployment of approx. 2,00,000 Smart Meters are the city of Jammu & Srinagar under JKPDD service area.

In J&K, altitude varies from 300m to 3500 mtr and minimum temperature goes up to -30°C, Equipment supplied shall be suitable for working in such type of environmental conditions and shall have requisite type test certificate specially required for such type of environmental conditions. The offered items shall be designed to operate in varying environments. Adequate measures shall be taken to provide protection against contaminants, pollutants, water & moisture, high altitude, ice loading, lightning & short circuit, vibration and electro-magnetic interference etc.

3. Existing IT Systems in JKPDD

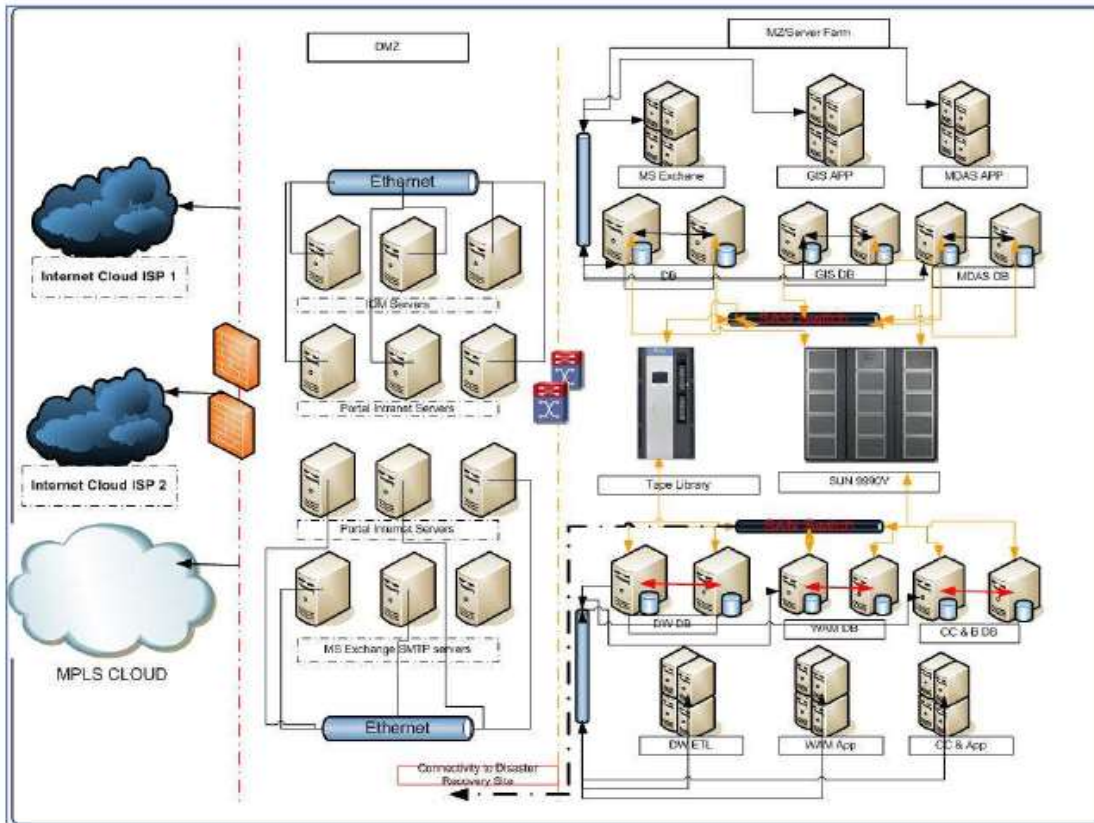
JKPDD is having 2 Software Applications for Consumer Metering, Billing and Collection management. The one is Oracle Utility Software application implemented by M/s Wipro under RAPDRP scheme for 30 Towns and the other one is NIC developed (Front End – Visual Basic and Data Base is SQL) Application. Both the system having a 13-digit unique customer account code across both the application. JKPDD is also facilitating WEB page and mobile application for Consumers for tracking Consumption and payment processing.

The R-APDRP System envisaged following Modules implemented in Place:

#	Scope of Application Packages under RAPDRP	Product OEM
1	Meter Data Acquisition	Amitech
2	Energy Audit	Oracle India Private Limited
3	New Connection	Oracle India Private Limited
4	Disconnection & Dismantling	Oracle India Private Limited
5	GIS based Customer Indexing and Mapping	ESRI
6	GIS based integrated network analysis	ABB Limited
7	Centralized Customer Care Services	Oracle India Private Limited
8	Management Information System	Oracle India Private Limited
9	Web Self Service	Oracle India Private Limited
10	Identity and Access Management	Oracle India Private Limited
11	Metering	Oracle India Private Limited
12	Billing	Oracle India Private Limited
13	Collections	Oracle India Private Limited
14	Asset Management	Oracle India Private Limited
15	Maintenance Management	Oracle India Private Limited
16	Mail & Messaging	Microsoft Corporation (India) Private Limited

The Oracle Utility MDMS version implemented is “Release 2.0.1 Service Pack 8”. the Version to be upgraded to the 2.2.0.3.0 (latest Sep 18 release) or Other latest applicable version of Oracle utility MDMS as this has to be used and integrated with the proposed HES System under this project.

Existing architecture of IT systems at JKPDD is shown in below figure:



4. Scope of works

FIGURE 1 -JKPDD- EXISTING SERVERS ARCHITECTURE- IT INFRA

The scope of work includes following:

- 1) The scope of work shall include, in complete conformity with subsequent sections of the specifications, site survey, planning, design, engineering, manufacturing, supply, transportation & insurance, delivery at site, unloading, handling, storage, installation, integration, testing, commissioning, demonstration for acceptance, training, maintenance and documentation of:
 - i. Single Phase whole current Smart Meter with prepaid functionalities
 - ii. Three phase whole current Smart Meter with prepaid functionalities
 - iii. Communication infrastructure (DCU/Access point)
 - iv. Meter box for single phase and three phase whole current meter.
 - v. All associated hardware and accessories for installation of Smart meter & DCU such as service cable, piercing connectors, Polycarbonate boxes etc.
 - vi. Head End System hardware & software
 - vii. Integration with all existing applications of JKPDD along with warranty and O&M/FMS for 5 years from date of Go-Live.
 - viii. Consumer portal including support for prepayment
 - ix. AMI Infrastructure hardware such as Server, Workstation, Storage, Network devices, printer, etc. at Jammu & Srinagar
 - x. Integration with other applications existing RAPDRP system, cost of integration shall be built by bidder in this project.

- xi. Planning, deployment, tuning the communication system including RF and GPRS to meet performance requirements as specified in the bid document
 - xii. Cabling associated with communication systems and power supply source
 - xiii. Any other material and services mentioned elsewhere in the bid document
2. Bidder to replace the old meters (wherever applicable) and safely deposit the same to JKPDD stores while maintaining Proper storage and Digital record of meters that is in the store or has been installed through Bar code/QR code. JKPDD officials shall prepare documentation as per meter change Protocol of JKPDD including taking photographs of the reading of old meter while changing of meters.
 3. Selected bidder will propose & establish the solution initially for approx. 2,00,000 Smart Meters (1.0 Lakh in Jammu City + 1.0 Lakhs in Srinagar City) but it should be horizontally & vertically scalable to cover the entire utility consumers in future. Further, 100% of meters shall be covered through RF Communication network, however considering the hilly terrain area, upto a total of 10% meters may be allowed on GPRS/3G/4G subject to approval from RECPDCL/JKPDD.
 4. The bidder shall provide the HES suitable to support the collection and storage of data as per performance level for 11.25 Lakh smart meters scalable up to 20 Lakh smart meters. The bidder shall supply and commission one HES that shall have the capability of supporting APIs from minimum 5 meter manufacturers thereby allowing data exchange with minimum 5 meter manufacturers.
 5. The bidder shall confirm that, the HES has sufficient logic driven smoothening built in features, for example: reliably determining current status of a meter once an outage alert is received from the meter, as well as, ability to suppress or filter false positives from outage and restoration notifications. There should be provision for deploying more such user defined logics.
 6. Bidder is required to provide set up in active passive DC-DR setup (where DC & DR will have same capacity). The designed solution must have provision of automatic switchover in case of failure with RTO <= 1 hour & RPO <= 30 minutes.
 7. Site survey for identification of network design (equipment locations etc.) and detailing out comprehensive bill of material.
 8. Study of existing IT system of JKPDD to ensure seamless integration of proposed system under the scope of this RFP. Bidder is required to bring out any additional requirement with proper breakup for solution deployment and quote the prices for the same, otherwise anything required during implementation stage shall be supplied by the bidder free of cost as in order to comply with functional requirements as mentioned in RFP.
 9. Development of communication interface module for Smart Meter to enable data flow from meter to existing MDMS as per frequency defined in SLA in the RFP.
 10. Study of existing Oracle Utilities MDMS for required functionality as specified in RFP document and upgrade the same to latest applicable version 2.2.0.3.0 (latest Sep 18 release) including installation, commissioning and Data Migration from existing MDM to Upgraded MDM suitably for Smart Meter Integration for JKPDD and its integration with existing IT system (as per SRS documentation prepared after award of contract). Billing application needs to be configured accordingly. Bidder shall ensure that propose hardware requirement (Server/Storage) should be scalable for 20,00,000 consumer meters data .
 11. Technical & functional training to JKPDD staff and associated documentation for all deployed systems to ensure a smooth transition from deployment to post-deployment operations and maintenance of the system.
 12. The bidder shall provide comprehensive deliverable details for successful implementation of the project such as H/W, S/W, tools etc. as desired by JKPDD in this document.

13. The bidder must provide network redundancy (50% of Full load capacity) for each element other than nodes, while designing the system for self-healing features. Bidder to clearly specify performance parameters to capture this commitment consistently. Communication NIC cards/ SIM Cards (as per live database of system as on that date) in the network should be accessible from HES at any point of time. Bidder should design the system accordingly. The bidder shall confirm that, the bandwidth made available by the Ministry of communications for this purpose, shall not in any way limit or hamper the performance of AMI. Bidder to submit Equipment type approval from WPC & any other clearance as per applicable regulations by GOI and/or State Government; to ensure that equipment operate in designated frequency band and power levels.
14. Bidder to submit it's aftersales service support plan and escalation matrix in order to meet contractual obligations and performance guidelines. Bidder should have two service offices one each in Jammu and Srinagar, once PO is awarded.
15. In future, it would be bidders' responsibility to extend the support to integrate new meters or any other application/equipment as decided by JKPDD in the project area without any additional cost burden on JKPDD during the contract period.
16. Interoperability for AMI shall be done at HES level. Communication at HES and Optical Port/RJ11 Port should be as per applicable Indian Standards i.e. IS-15959 part 2/ part 3 (latest amendment).
17. The bidder shall ensure the up-gradation of the Firmware / software in the communication modules/devices from remote from time to time to meet the increasing demand of the system in operation / overcoming system limitations / bugs. The bidder shall also ensure incorporation of new hardware (communication devices, meter, NIC etc.), if required, in future. The bidder therefore shall ensure that all such upgrades shall seamlessly fit into the existing end to end system in operation and shall be backwardly compatible to the earlier generation devices / software / Firmware in operation to guard against obsolescence at no additional cost to JKPDD during the contract period.
18. The bidder shall spell out the time duration required and associated success rate in case of OTA firm-ware up-gradation on number of meters/communication devices simultaneously, well in advance, from the design stage and shall also ensure that all these Access points & Nodes to be used in the system shall have more than adequate memory capacity for the Firmware upgrades to happen smoothly, and securely, meeting the possible changing enhanced expectations for next 10 years after complete Go-Live, as well as, avoiding overwriting operations during the Firmware upgrades, thus avoiding obsolescence of the hardware installed at site in quick time.
19. The Communication network should be designed in such a way that it can accept improvements based on the experience / performance / new expectations/need from time to time.
20. In case communication network under scope of this RFP is developed exclusively for JKPDD, Bidder to commit that the communication media is transparent and shall be exclusively used for data transfer of JKPDD and that capacity can be allocated such that it will not be used for any other purpose without any written consent from JKPDD. Bidder shall submit corporate principal certificate for adherence of this clause.
21. The bidder shall guarantee for providing service & expansion support in the aforesaid area for at least 5 years after completion of FMS period. Any upgraded network elements should have backward compatibility.
22. The offered solution including (H/w, s/w, OS, licenses & others) shall have life cycle of 10 years from post complete Go-Live date.
23. Specifications of hardware shall be provided along with bid and Manufactures Authorization for warranty & guarantee shall be in Name of JKPDD.
24. Bidder shall provide 3rd party security audit for complete system certification after post go live.

25. Bidder should share roadmap (lifecycle) for all network elements. Bidder shall upgrade or replace third party equipment and associated software configuration/integration requirement free of cost in case the support on said equipment is withdrawn by respective OEM during this period i.e. declared as End of support by OEM.
26. For all devices which are proposed to be installed in open should have IP 55 class or higher. All proposed devices should withstand extreme weather conditions as applicable to J&K. Devices should be immune to stray Electric Fields and surges.
27. Offered solution to comply with the existing applicable BIS standards and guidelines issued by MoP/NSGM/CEA etc. for applications as mentioned in RFP & its Feasibility to change / modify the offered solution based on changes happened in standards in future.
28. Prepaid Functionality: All the Smart meters should be ready to be used as any type of configuration i.e. Prepaid, Postpaid & Net Metering as mentioned in relevant standard.
29. All the meters are proposed to be installed on Poles. There will be 3 combinations of Meter boxes used to install the single phase meters i.e. Meter Box with One Meter, Meter Box with two Meters & Meter Box with 4 meters. All three phase meters will be installed in single box. The specification of single phase & three phase meter box are provided along with indicative drawing for 2/4 meter box. Subsequent specs & technical details for 2/4 Meter boxes will be submitted by bidder for approval for Project execution.
30. It is proposed to replace some of the damaged Service cables of old meters based on the Survey report. All the activities for installation of new cable with clamps & connectors along with removal of old cables is in the scope of bidder.
31. Bidder to provide detailed solution document along with sizing sheet and all proposed hardware required to implement the solution along with the bid. .
32. Bidder has to conduct a feasibility study for integration of existing setup with the proposed solution after award of contract.
33. Bidder has to provide network architecture diagram after feasibility study has been completed.
34. Bidder has to propose the hardware considering the following minimum requirements:
 - No single point of failure in the back-end hardware
 - Redundancy in equipment for all active components
 - Equipment should provide RAS feature
 - Proposed equipment should be energy efficient
 - Proposed equipment should be branded, manufactured by a branded OEM

Proposed equipment should have 7-10 years future roadmap (A copy of the same shall be shared during bid submission) All proposed equipment should be scalable by at least 30% unless specified. Scalability should be till the port and component level. Bidder is expected to provide Bandwidth requirement for fetching data of 2 Lakh meters and scalable capacity from Meter to DCU , DCU to HES and Meter to HES by using hybrid configuration of RF Mesh/MPLS/GPRS/3G/4G/VSAT). Further, 100% of meters shall be covered through RF Communication network, however 10% meters can be allowed using GPRS for communication directly with HES subject to approval by JKPDD based on feasibility study.
35. The quantity of all equipment/materials given in the Price Schedules of the bidding documents are provisional. The variation in quantity shall be limited to plus/minus (+/-) thirty percent (30%) for the individual items, total variations in all items under the contract shall be limited to ten percent (10%) of the contract price. For quantity variation of the individual items beyond twenty percent (20%), the matter shall be referred to the Employer for mutually agreed rates

36. Further, before award of contract, the final quantity may vary based on the available budget and cost discovered through tendering process. Additional budget may be resourced by JKPDD during the period of contract for placement of the order for remaining quantity.

37. Submission of Documents

In addition to the document as required in QR section following additional documents are to be submitted along with the offer by the bidder(s):

- Network design report of proposed solution for geographical area of Jammu and Srinagar City /Town.
- Detailed specification & Guaranteed Technical Particulars of devices / hardware to be used.
- All necessary test Certificates & licenses wherever applicable
- GTP & deviation sheet.

There are other administrative expectations such as maintenance of local warehouse(s) at Jammu city and Srinagar city for storage of AMI & Smart Meters components, checking by RECPDCL/JKPDD & subsequent distribution to end users.

Factory Acceptance Tests shall be carried out on features & functionalities as decided by RECPDCL/JKPDD from time to time and the communication devices shall be accepted if it remains within the acceptance criteria. Depending upon deployment terms and other conditions, pertaining to handling & delivery, shall be detailed and discussed subsequently with the selected bidders before commercial bidding process for final roll out.

38. Maintenance of the Network during Rollout

- All network communications equipment shall support local (on-site) and remote (system head end) non-intrusive diagnostics capable of detecting any abnormal operating parameters including, but not limited to, network communications, memory failure, power supply degradation, microprocessor failures (e.g. Computer Operating Properly watch dog events), firmware/software problems, excessive device temperature, SNR degradation etc.
- Bidder is required to implement the solution while covering 100% of meters through RF Communication network, a maximum of 10% of total meter quantity may be allowed on GPRS communication subject to approval by JKPDD based on feasibility study.
- JKPDD shall engage and facilitates GPRS/3G/4G Communication provider separately through tendering process and shall be paying for the Sim, wherever installed (i.e. for DCU backhaul communication and GPRS/3G/4G enabled meters). Further, the System Integrator engaged for installation of meters shall facilitate system generated report of uptime/failure of any SIM Cards installed by the communication provider to JKPDD in timely manner to ensure their uptime of SIMs.
- Transition period for end Point will be considered as 1-month post installation. i.e. if a meter is installed on day 0, by 30th day it will be considered for all SLA as per this RFP.
- It will be the responsibility of bidder to maintain SLA after 1 month of installation of any end point. However, during this transition period, the bidder should ensure monthly billable read to ensure that communication of end point is well established using the offered solution.
- Transition period will be considered as 3 days' post installation of other network elements except smart meters. On expiry of transition period for network elements SLA will be applicable.
- Rollout period will be considered from date of deployment of the network to deceleration of post go live.

39. Less than 1.5% failure rate per annum for all network communications equipment over the extended operating life of the system. (Operating life and extended life of the equipment is typically defined by contract between the utility and the communication equipment supplier.) Bidder to replace all equipment free of cost and an additional penalty of 1% of AMC per month for every subsequent 1% increase in failure rate over and above 1.5% shall be deducted.
40. The network solution provider shall ensure that latest network & cyber security methodologies and controls are exercised fully and not diluted at any point of time.
41. The network solution provider shall ensure two-way communication success rate, for both AMI & operational applications and response time within 6 seconds for operations of demand response and switching of electrical devices with a success rate of 99%-, consistently.
42. The network solution provider shall ensure Turn Around Time (TAT) for response in the following manner under service disruption.
 - a. Over and above the criterion mentioned in this document, JKPDD reserves the right for prioritization of any issue at any point of time.
 - b. The bidder shall submit a report on the network status on daily, weekly and monthly basis, for monitoring of condition of system to project Nodal Officer deputed by RECPDCL/JKPDD.
 - c. Penalties shall be there when the performance of the system shall be below the threshold parameter, as mutually agreed and documented, which will be judged on the availability of AMI data availability over a period.

43. Applicable Standards, Frequency and Statutory Approvals

- a. The system and all individual equipment and components must comply with all relevant statutory requirements and regulations that are set by government authorities, such as the Wireless Planning & Coordination (WPC) Wing of the Ministry of Communications and Information Technology. Wireless technologies need to comply with the Indian statutory bodies that govern communication related aspects such as WPC (Wireless Planning Co-ordination wing) which oversees licensing and management of all wireless spectrums in India. Equipment Type Approval (ETA) is to be obtained for communication modules as per Department of Telecom, Government of India requirements. Radio emission characteristics for the chosen band shall comply with latest NFAP and the G.S.R (General Statutory Rules) notifications from Department of Telecom, Government of India.
- b. All documents demonstrating compliance, approval and usability must be submitted by the bidder along with the technical proposal. Failure to do so may result in bid disqualification. Any statutory clearances related to installation will be in JKPDD's scope but has to be facilitated by the bidder.
- c. The RF Mesh Communication Devices shall comply to the following standards: IEEE 802.15.4 – IEEE standard for Information Technology – Telecommunications and Information Exchange between Systems – Local and Metropolitan Area Networks – Specific Requirements Part 15.4: Wireless Medium Access Control (MAC) and Physical layer (PHY); IEEE 802.15.4g – IEEE Standard for Smart Utility Networks or any other equivalent standard /alliance.
- d. The bidder to submit relevant certification in order to validate the conformance and interoperability of their IEEE 802.15.4 and IEEE 802.15.4g or equivalent implementations.

44. Data Migration

Data is to be migrated from its legacy systems as per requirement of the JKPDD. The legacy consumer database and MBC database shall be updated through the master data provided by the AMI Implementation Agency. Data to be migrated will be cleansed, rationalized, transformed (if required) and reconciled. Conversion programs may need to be written to handle this task.

The following is the indicative list of the type of data that must be migrated to/from the legacy system.

- a. All Open transactions at the time of replacement of old meter with Smart meter
- b. Old/New customer/master data
- c. New Meter Data
- d. Events and outage data for analytics, reporting purposes etc.
- e. All meter exceptions and alarms
- f. All user groups and user roles
- g. Historical usage/billing data (which includes interval/scalar meter data and usage data) require to migrate (may be last 2 years of data or more as per business need) – due to estimation purpose, Re-bill generation, proration/profiling (as part of estimation), load forecasting purpose etc.

In addition, the AMI Implementation Agency shall ensure that any other data that is required to be migrated for the optimum operations of the AMI system needs to be taken up for migration. It is the responsibility of the AMI Implementation Agency to ensure that at all times the field data (customers, meters, etc.) shall be in sync across all the systems both legacy and new.

45. Ease of Management

The solution must factor capabilities and features that allows for ease of management and trouble-shooting. The underlying technology needs to be user friendly. By having easy to use principle, training can be kept to a minimum thereby aiding IT change management and the risk of using a system improperly can be minimized. The solution shall provide support:

- a) Monitoring of services using monitoring tools like Enterprise Management
- b) Ability to provide backup and restore of data
- c) Support maintenance, enhancement and refactoring the solution without architectural changes
- d) Administering the solution with minimal user intervention and using role based administration, well defined user interfaces and access policies
- e) Ability to log and report at a sub-system level state, health of the solution. It shall also log different events encountered by the subsystem.

46. N-Tier / Modular Design

The application user interface, logic, data must be separate. The logical design of components, subsystems, application systems and databases will be ideally partitioned. These partitions shall have well-defined interfaces established. Logical boundaries are needed to separate components from each other. Modular design is more adaptive to

changes in internal logic, platforms, and structures. It is easier to support, is more scalable and supports interoperability.

47. High Availability, Failover and Load Balancing

Proposed Architecture shall have adequate redundancies so as to have no single point of failure for the solution. The solution tier for critical applications should consist minimum of two nodes clustered on a fail-over configuration for the critical components like Web, application and database servers at the Data center site. On failure of the primary application server, the 'failover' server shall take over processing, similarly on failure of a database server, the other server shall continue seamlessly, thus providing the desired availability.

AMI applications shall have the capability to failover to a redundant or secondary unit upon failure of the primary unit. Likewise, the load on the primary unit shall be shared with a secondary unit upon the primary unit reaching its capacity.

48. Business Continuity and Disaster Recovery

In case if primary site / DC (Srinagar) fails, the business shall continue from DR (Jammu) site. Connectivity between primary site and DR site shall be redundant. In case of Failures of Storage at DC, DR Backups shall be used to restore the Database from the last backup taken. This shall be defined in Backup policy during project execution. AMI Implementation Agency shall propose the backup strategy and any other additional BoM if needed to meet this requirement. Bidders are expected to keep the above issues in mind and propose technically best alternative to ensure that the system is available for the users in all times by conceptualizing various scenarios and explaining how their solution addresses all the possible scenarios. While the Bill of material proposed is the bare minimum required to be supplied, AMI Implementation Agency shall propose additional BOM as may be required to meet the above objectives.

49. IT Infrastructure: Zoned Deployment

The IT Infrastructure will have multiple security layers to secure the infrastructure from threats. The proposed deployment shall have different security zones as briefed below and all zones shall have separate firewall in addition to the external (Perimeter security appliances). The firewall policies shall be configured based on zone based requirements.

a) Militarized security Zone for Production Servers (Database and Application Server Farm (MZ):

Militarize Zone (MZ) will secure host all critical application, Data Base server, Storage etc. The Zone shall not be accessible from Internet directly. All user traffic will to enter in this security zone after firewall only. The proposed solution will have provision of dedicated Internal Firewall to secure the critical production (Data base and Application) environment.

b) Demilitarized Security Zone (DMZ) Web server Farm Zone:

This security zone will host all servers that can be accessed from external users after authentication and traffic filtering. This zone shall host the Web servers, Access control and sign on servers, Antivirus Server etc.

c) Test, development and Staging zone (TDSZ):

This zone will host all servers required for test and development for applications. This zone will have limited access and it will not have any direct access to Production zone (MZ) and the activity shall be monitored.

d) IT infra management zone

The technical manpower proposed by Service Provider for DC and DR infrastructure will use this facility and will be able to access the infrastructure from this zone only. This can be based at JKPDD HQ or other proposed sites by JKPDD. Traffic for this zone will be virtually segregated / zoned by firewall.

50. Information Security: Log Monitoring and Correlation

All Servers / sub systems / network devices / appliances as proposed by AMI Implementing Partner shall have capability and throw logs to the log server. The Logs and events generated by network and hardware component / devices of the system shall be monitored. AMI Implementing Partner must provide a Security information and event management (SIEM) solution for the same which shall be capable to provide various security alerts, events, logs generated from various IT infrastructure (Hardware/Software) components. AMI Implementing Partner would need to ensure the IT security compliance and therefore monitor the threats/logs generated by various equipment's /sub systems.

51. Backup and Recovery

Data is an asset, just as personnel, physical resources, and financial resources are assets. Data and information are resources that are extremely valuable for the organization; hence data management processes must be in place to maintain the data. AMI Implementation Agency Partner needs to prepare a backup policy which shall be approved by RECPDCL/JKPDD. AMI Implementation Agency would be required to design detailed backup and recovery policies which shall be implemented at the time of deployment and the responsibility of taking backups and testing the backups as per the backup policy shall be of AMI Implementation Agency for the entire project period. AMI Implementation Agency shall ensure that the data is replicated at the backup and DR Site. AMI Implementation Agency shall be responsible for safe and secure storage of complete data.

52. Policy and Documentation

Bidders will have to develop, document and implement the following:

- Data Backup, Archival and Retention Policy
- Security Policy
- Business Continuity and Disaster Recovery Policy

All the policy and procedure which will ensure availability and security at all times, these policies have to be updated every year or as per requirements of RECPDCL/JKPDD. AMI Implementation Agency MUST design and implement the policy (with RECPDCL inputs) in compliance to the ISO standards (such as Information security ISO 27001). Design of Information Security Policy shall necessarily include but not limited to the following policies to ensure IT security:

- IT Risk Management Policy
- Information Classification Policy
- Access Control Policy
- User ID and Password Management Policy
- Internet Access Policy
- Asset Management Policy
- Incident Management Policy

53. Scalability

Scalability is the most important aspect of the project. It is envisaged that the users and geographic locations may increase over the next few years. The system architecture and the network design shall have the ability to handle the growth with respect to functions, users, load and geographic sites. Also, applications must evolve to support new business requirements and make use of new technologies. Bidder must factor both vertical and horizontal scalability in the design and deployment of JKPDD AMI application. The sizing of AMI solution shall be done for 2 Lakh smart meters, with complete Backend IT infra for 11.25 Lakh consumers with scalability for the offered solution, i.e. upto 20 Lakh smart meters.

54. Technical Obsolescence

The systems including communication technologies, which are at a risk of technical obsolescence over the next few years and over the operating life of the system shall be identified and reported. This may also include end-of-sale and end-of-support policies governing the proposed technologies. The compatibility between the various elements of the system need to be considered and mitigation options, not be limited to periodic update from OEM/system supplier/AMI Implementation Agency, shall be indicated in detail.

55. Meter Installation at Consumer Premises

The smart meter installation shall be done by the AMI Implementing Partner as per the meter installation guidelines of the JKPDD.

I. Scope of Meter Installation

The scope of installation work is two-fold and shall include the cost of all labor (electrical, civil and others i.e. replacement / installation of Smart Meter, Box, Service Cable etc), materials, tools and other incidental expenses in connection with additional labor requirement. Sealing of meter and Meter Box is in the scope of AMI Implementing Partner being selected through this tender. Seal Management shall be in the scope of bidder. However, supervision and monitoring will be done by JKPDD official. Supply of new service

cable etc. shall be provided as per price bid. The AMI Implementing Partner shall seek for approval from RECPDCL/JKPDD for installing smart meters. The details are:

a. Meter Inventory Management and Warehousing

AMI partner shall initially open/provide a warehousing facility and manage the inventory till the contract period of the project. Bidder should maintained the Proper storage and Digital record of meters that is in the store/has been installed through Bar code to be maintained by the bidder The land shall be provided by JKPDD while the bidder shall construct temporary shed for storage of material.

Meter management, ownership and installation shall be the responsibility shall lie with the AMI Implementation Agency. Any physical damages including fire and theft and damages not covered by OEM shall be the responsibility of AMI Implementation Agency. Cost of same shall be recovered from AMI Implementation Agency's payment.

b. AMI Site survey (RF Mesh /GPRS feasibility analysis etc.)

The broad scope of site survey will include the following but are not limited to;

- i. Capturing complete meter details (Meter type, make, class, serial no., YOM, attached consumer, etc.)
- ii. Conducting feasibility analysis of the RF Mesh and GPRS connectivity at individual sites and capture details.
- iii. Capturing details of newly installed smart meters.
- iv. The master data populated after AMI site survey shall be in the same format as for the consumer indexing survey to ensure data consistency.
- v. Post completion of Smart Meter installation it will be the responsibility of the AMI Implementation Agency(s) to ensure that the master data of the AMI system is in sync with that of the RAPDRP systems.

c. Meter Installation

Installation services shall be performed in a professional and courteous manner, from initial appointment setup to final installation of the meter. Customer service, effective project team and customer communication are of the utmost importance to this project. All site installation personnel employed on this project will be subject to background checks and shall, at all times, carry a suitable Govt. issues photo ID (such as Driving License, Voter Card, Aadhaar etc.) for identification.

Scope of AMI Implementing Partner shall include:

- i. Removal of Old Meter & taking down the meter reading
- ii. Installation of new smart meters with RF mesh NIC or GPRS Sim card
- iii. Install NIC/SIM Card in the meter & activate / register new meters with Head End System & MDMS.
- iv. Transfer Old & new meter data to the JKPDD (JKPDD Billing Software)
- v. Provide and capture location of installed meter (s) along with GPS coordinates, namely latitude and longitude, and enter the same in the AMI Solution Database.
- vi. Digital photograph of meter reading before and after installation

- vii. Train the JKPDD installation personnel
- viii. Manage the installation performance
- ix. Provide daily, real-time project status updates of installations to RECPDCL & JKPDD.
- x. **Meter Location:** The meter shall be preferably located on nearest poles outside the consumer premises suitable for physical inspection without entering into consumer's living area.
- xi. **Civil Works:** Required Civil works associated with the installation of the smart meters for the stability of meter case is to be done by the AMI Implementing Partner only with the approval of the concerned authority.
- xii. **Service Cable:** Bidder shall be responsible for providing of Service cable for approximately 30% of the consumers along with accessories and connectors (eg Piercing connectors, Main Service Distribution box etc.) as mentioned in BoQ.
- xiii. **Installation Quality:** RECPDCL/JKPDD specific checks would be carried out on the quality of installation by checking performance of the meters & accessories, wiring methods, alarms, communication to control centre and time lag in meter data acquisition.
- xiv. **Installation Schedule:** The AMI Implementation Agency shall establish an overall methodology and schedule for installation of each phase of the project. AMI Implementation Agency will provide JKPDD / RECPDCL a schedule of where work is planned for that day and each subsequent day of that week. The purpose of this information is to provide coordination and communication between the JKPDD and AMI Implementation Agency /installer for the work. If the schedule changes for whatever reason, an updated daily schedule shall be provided.
- xv. **Work Hours:** AMI Implementation Agency shall propose normal work hours, which must be approved by the Utilities. AMI Implementation Agency must indicate the number of people proposed for all installation periods, including evening and weekend times.
- xvi. **Response to Complaints:** Should the AMI Implementation Agency or its installation contractor receive a call or complaint from a customer or the JKPDD / RECPDCL regarding installation, the AMI Implementation Agency shall immediately log the call, including caller's name, address, account number if available, date and time of call, nature of problem and the action taken. Copies of all call logs shall be forwarded to the RECPDCL/JKPDD not less than once per day.
- xvii. **Improper Installations:** The AMI Implementation Agency shall be responsible for replacing any meter improperly installed and for correct any damage to meters by use of improper tools etc. during installation.
- xviii. **Material Scrap/Disposal:** All debris resultant from the excavation or construction operation shall be removed from each installation site the same day at the AMI Implementation Agency's expense. No excess materials shall be dumped on private property or deposited into the storm drains or sewer. Disposing of all waste and all debris in accordance with Local, State regulations at the contractor's expense.
- xix. **Maintenance & Post-Installation Support:** For 15 days after the meter has been notified as installed, AMI Implementation Agency must respond to calls from the JKPDD/ RECPDCL / Consumers associated with that installation on a 24-hour-per-day basis. AMI Implementation Agency shall be responsible for correcting, rectifying anything that could reasonably be attributed to the meter installation.

AMI Implementation Agency shall maintain 24/7 telephone support for AMI Solution including meter installation:

- a) Access via email, telephone, mobile, web, with request tracking system
- b) Priority levels that helpdesk system shall help distinguish the level of urgency for each call
- c) Self-service support
- d) Provide information about periodic system enhancements and updates.

d. NIC/SIM card management

AMI Implementation Agency shall ensure the availability, insertion and management of The NIC cards to be used in RF Mesh communication module of smart meters.

However, GPRS SIM will be provided by JKPDD to the AMI Implementation Agency. In order to pursue this, following points need to be ensured by the system Integrator.

- i. Procurement and availability of RF NIC cards from NBSP before the installation starts.
- ii. AMI Implementation Agency will be responsible for management of SIM inventory including but not limited to total installed, in-stock, replaced and rejected/suspended/terminated NIC or SIMs.
- iii. AMI Implementing Partner shall ensure that the NIC or SIM information is available in the head end system before physical installation is carried out.
- iv. AMI Implementing Partner shall ensure quality aspect of physical NIC or SIMs from NBSP along with the maintenance of buffer stock of NIC or SIMs & their activation - deactivation.
- v. AMI Implementing Partner shall ensure timely suspension, termination, activation and reactivation of NIC or SIMs and the process shall comply to the prevailing regulations of DoT / TRAI & shall be approved by RECPDCL.
- vi. AMI Implementing Partner need to monitor the usage, alarm, events and connectivity of NBSP core components for the SIM cards used in AMI solution.
- vii. NIC or SIMs needs to be preconfigured for activation before meter installation begins and SI shall work in close coordination with Telecom Service Providers.
- viii. AMI Implementation Agency shall ensure that communication module is properly sealed after NIC or SIM insertion before installation.
- ix. Replacement of faulty NIC or SIM cards as per the agreed SLA.
- x. Provide daily, real-time project status updates of installations to RECPDCL & JKPDD.

Approach and Methodology

1. SMART METERS AND AMI IMPLEMENTATION

Meters

Bidder to supply following type of Smart Meters as per mentioned BoQ.

Type of Meters
1. Single phase whole current Smart Meter
2. Three Phase whole current Smart Meter

A. SINGLE PHASE WHOLE CURRENT SMART METER

This specification covers the technical requirements of design, manufacturing, testing & integration with network integration card (NIC) of RF communication or any other technology (GPRS/3G/4G) to be used at JKPDD for LT Single phase two Wire, 5-60 A static smart meters of accuracy class 1.0 (here after referred as meters) complete with all accessories for efficient and trouble free operation.

It is not the intent to specify completely herein all the details of technical design and construction of material. However, the material shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith.

The offered material shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.

B. THREE PHASE WHOLE CURRENT SMART METER

This specification covers the technical requirements of design, manufacturing, testing & integration with network integration card (NIC) of RF communication to be used at JKPDD for three phase four Wire, 3 x 240 voltage, 20-100A, whole current static smart meters of accuracy class 1.0 (here after referred as meters) complete with all accessories for efficient and trouble free operation.

It is not the intent to specify completely herein all the details of tech design and construction of material. However, the material shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.

C. Functional Requirements for Advanced Metering Infrastructure (AMI)

These functional requirements define the minimum functionalities and performance for AMI system proposed to be developed in J&K. The main objective of AMI is to enable two way communications between smart energy meter and Head End System (HES) to enable remote reading, monitoring & control to serve as repository of record for all raw, validated and edited data. The sanitized data may be subscribed by other utility function for higher order analysis, billing and collection, energy audit, visualization etc.

1. Basic Functions of AMI

- a) The AMI system shall help utility to manage their resource and business process efficiently. AMI system shall support the following minimum functionalities:
 - i) Remote Meter data reading at configurable intervals (push/pull)
 - ii) Time of day (TOD)/TOU metering
 - iii) Pre-paid functionality
 - iv) Net Metering/Billing
 - v) Alarm/Event detection, notification, visualization and reporting
 - vi) Remote Load Limiter and connection/ disconnection at defined/on demand conditions
 - vii) Remote firmware upgrade
 - viii) Integration with other existing/new systems like IVRS, Billing & collection software, consumer indexing, new connections & disconnection, analysis software, Customer relationship management (CRM) system, Smart Grid Project etc.
 - ix) Import of legacy data from existing modules/MDAS of RAPDRP system. The extent and modalities of integration with the existing systems, including RAPDRP has to be worked out by the bidder.
 - x) Security features to prevent unauthorized access to the AMI including Smart meter & meter data etc. and to ensure authentication of all AMI elements by third party.
- b) This is only an indicative but not exhaustive list. The system should be capable to support the other functionalities as per the requirement of utilities.
- c) The System should accurately maintain system time synchronization across all devices to ensure accuracy of data. The system should support the interfacing with the future Smart Grid functionalities, Electric vehicle, distributed energy resources etc. The communication network shall preferably be able to support multiple applications.
- d) The Bidder shall submit an approach paper describing overall architecture and operational philosophy of the proposed AMI solution and methodology for achieving different functionalities, specified in this document and also highlight additional features, if any.

2. General AMI System Requirement

Smart Meter (Single phase whole current, Three phase whole current) for consumers shall be provided preferably based on Radio Frequency (RF) mesh in license free frequency band. The smart meter data using RF mesh shall be collected by Data Concentrator Units (DCUs)/Access point and transported to HES through WAN while the data from smart meters using GPRS/3G/4G technology shall be transported directly to HES through WAN. The bidder shall be responsible for proper data exchange among Smart meter, DCU, MDM, HES and other operational/requisite software as part of fully functional AMI system.

Bidder shall adhere with the appropriate security algorithm for encryption and decryption. For smooth functioning of the entire system, it is essential that the details of such algorithm including the mechanism of security key generation be kept in a secured escrow account which shall be used by the utility only in case of termination of the contract for reasons whatsoever.

The following core components of AMI system shall be provided:

- i) Smart Meters
- ii) Communication infrastructure
- iii) Head End System(HES)
- iv) Meter Data Management System (MDM)(existing to be upgraded)
- v) Web application with updated on-line data of consumers, Integration of Billing, etc.
- vi) Mobile app: Bidder shall provide a mobile app through which consumer shall be able to log in through android/iOS/Window based mobile app to see information related to his/her energy consumption. App shall also provide platform for implementation of peak load management functionality by providing existing tariff & incentives rates, participation options etc. This mobile app shall be part of complete system and therefore no additional cost shall be payable for up gradation / maintenance separately.

3. Smart Meters (Single phase & Three phase)

Single Phase & Three Phase Whole current smart meters shall comply with the enclosed Technical Specifications. The supplier / manufacturer would furnish valid BIS certification before supply of meters. The Smart meter installation shall be done by the bidder as per the rules and regulations and practices of Utility. Bidder shall prepare documentation as per meter change Protocol of JKPDD including taking photographs of the reading of old meter while changing of meters under the guidance and supervision of JKPDD official. Also, dismantled meters shall be deposited at Central Store of JKPDD by the bidder.

After meter installation, customer identification no., meter ID, its hardware & software configuration, name plate details, make, type i.e. Single Phase or Three Phase, etc .(as per requirement of utility) shall be updated in DCU/HES/MDM. The information would also be updated on the existing application/portal/app for providing information to consumers.

4. Communication infrastructure

The communication infrastructure should either be based on preferably RF mesh network or cellular network or a combination of these. The communication network shall be based on suitable standards from ITU/IEC/IEEE/CEN/ CENELEC/ ETSI for NAN and WAN network. Communication network shall provide reliable medium for two-way communication between various nodes (smart meter) & HES. RF based network should use license free frequency band available in India. The engagement of network service provider(excluding SIMs provided by JKPDD) would be in the scope of AMI Implementing Agency to meet the performance level as given in the document.

5. General Requirement

- i. The Bidder shall design a reliable, interference free & robust communication network keeping in view the site conditions. It shall be flexible in terms of providing communication in variable terrain & urban density.
- ii. The bidder shall design the network architecture keeping in view the existing and planned infrastructure of the utility. During designing, suitable consideration shall be kept for future expansion as per requirement of Utility. Before designing the communication network, the Bidder shall do the site survey and would provide the most efficient communication infrastructure.
- iii. The entire infrastructure & associated civil works required for installation & commissioning of equipment/devices like DCUs, repeaters, routers & access points etc. shall be in the scope of Bidder. The operational testing of all the network elements has to be demonstrated by the bidder to the satisfaction of the utility.
- iv. The network solution offered by the bidder should have disaster recovery mechanism in place. The redundancy mechanism of HES and MDM and their disaster recovery plan shall also be described by the Bidder.

- v. The quality of installation of the various equipment & power supply wiring to all field equipment shall be as per standards/ regulations/prevaling practices of the utility. The supply of electricity needed for operation and maintenance of entire AMI system shall be provided by the utility free of cost.
- vi. A suitable network management system (NMS) shall be provided to monitor the performance of the communication network round the clock. The NMS shall provide viewing of all the networking elements deployed at site and enable configuration & parameterization of the networking devices and the nodes.

7. Communication Network Elements (DCU based or Router Based):

- i) Data Concentrator Unit (DCU) based Communication Network
 - a) The Data Concentrator Unit is a gateway for communication of data between the Smart Meters and the HES. The Data Concentrator Unit receives information from the Smart Meter on a scheduled / need basis and stores the data, which can be accessed by HES for onward transfer to MDM.
 - b) The DCU provides the central link between Smart Meters and HES, enabling continuous/periodic meter read and control. DCU shall exchange data from smart meters on RF communication and with HES on WAN.
 - c) Since communication system is DCU based RF network, following requirement shall be met:
 - I. Hardware & Power Supply of DCU
 - a) Enclosure/box of DCU shall be IP55 or better compliant. A suitable mounting arrangement required for DCU installation shall also be provided.
 - b) A suitable and optimum power supply shall be provided keeping in view that even in case of outage in one or two phases, DCU can be powered. DCU should be capable of withstanding surges & voltage spikes of 6KV as per IEC 61000-4-5 standards. Power supply shall be terminated on suitable sized MCB to facilitate isolation during on-site maintenance.
 - d) DCU shall have battery with backup for atleast 4 hours for normal meter reading, to push tamper event, carry out on demand reading and the network health status / connectivity continuity & check. DCU should have the suitable feature to send power outage and restoration message to the HES. The battery shall have a guaranteed life of 5 years.
 - e) DCU shall have built in Real Time Clock (RTC) with separate battery backup. The battery shall have a guaranteed life of 10 years. It shall have self-diagnostic feature for RTC, memory, battery, communication module, etc. Alternatively, Software driven RTC may also be used as per agreement between supplier and utility.
 - II. Configuration, Functionality & Interface of DCU

DCU shall have following configuration functionalities:

 - a) It shall be able to configure the communication with underlying nodes/meters.
 - b) It shall pull data from the field devices and push the data at configured intervals to the HES. It should also support the HES in pulling data from the field devices/meters. The data acquisition (Push/Pull) frequency shall be programmable. DCU shall be capable to prioritize control commands.
 - c) DCU shall ensure a secure communication to HES and shall have internal memory for storing interval data for at least 5 days.
 - d) DCU shall support on demand read and ping of individual/group of meters.
 - e) It shall support IPv4 / IPv6 network addressing.
 - f) DCU shall push events like tamper, power off etc. to HES immediately on occurrence/receipt from field devices/meters.
 - g) The equipment shall be weatherproof, dustproof and constructed for outdoor installation on poles (minimum rating: IP-55). A suitable mounting provision shall be made for the equipment.

- h) Enclosure: Provision for security sealing shall be provided and in case the gasket of the cover is used for protection against moisture, dust and insects, the gasket shall be made of weather and aging resistant material.
- i) The list of standards followed in all the devices/equipment used in communication network shall be furnished

II. DCU Communication

- a) The DCU shall ensure the appropriate backhaul for secure transfer of data to HES. In case of GPRS/3G/4G backhaul, it shall support SIM card from any service provider. It shall have Wide Area Network (WAN) connectivity to the HES through suitable means.
- c) DCU shall be able to communicate with meters on RF mesh (license free band).
- d) DCU shall periodically monitor meter reads/downstream commands and shall retry and reconnect in case of failed events/reads.
- e) It shall push events like tamper, power off etc. to HES immediately on occurrence/receipt from field devices/meters. DCU shall be able to acquire and send data to HES for full capacity (as per designed for no. of meters/field devices) to ensure the performance level. Full capacity of DCU is required to be indicated in the offer.
- f) After Power Interruption, on restoration of power supply, DCU shall establish communication with underlying devices as well as upstream application automatically.
- g) DCU shall be able to communicate with the nearest meters depending on topographical features. For further communication among the meters, distance of the other meters with the DCU shall not be a constraint as communication of the nearest meters shall be established with other meters through appropriate mesh formation / other formation.
- h) Remote Firmware Upgrade: The DCU shall support remote firmware upgrades as well as remote configuration from the control center. Configuration of programmable parameters of smart meters shall be done through HES.
- i) All meters falling under one DCU shall be commissioned and checked for proper communication in presence of utility in-charge.
- j) DCU shall keep the records of minimum of the following events but not limited to:
 - No of packet failures
 - Retry attempts
 - Missed periodic readings
 - Failure to connect
 - Tamper events

ii) Router based RF Mesh Network

If communication system is router based RF mesh network, then following requirement shall be met. In this type of communication network, different nodes (smart meters) shall interconnect with each other using RF mesh network and they shall communicate with nearby routers to transfer the data to access points. In such communication network, if any routers/repeaters/access points fail, then nodes connected on that device shall automatically reconfigure the mesh with available nearby nodes.

I. General Requirement of Router based RF Mesh Network:

The general requirements for the Router based RF network are specified below:

- a) The communication network shall have dynamic & self-healing capability. If one of the communication element like router or access point fails then nodes connecting to that element shall switch to best available element for communication of data to HES.
- b) It shall support IPv4 / IPv6 network addressing.
- c) Each node shall keep a track of best available nearby nodes.

- d) The communication network equipment shall use licence free frequency spectrum as defined by Government of India.
- e) All the communication network equipment shall be certified by WPC, Government of India for operation in licence free frequency band.
- f) Suitable network management system (NMS) shall be available to monitor the performance of the communication network round the clock. The NMS shall provide viewing of all the networking elements deployed at site and enable configuration, parameterization of the networking devices and the nodes.
- g) It shall support remote firmware upgrading
- h) It shall be secure enough to avoid all cyber threats like DDoS, spoofing, malwares etc.
- i) The communication network shall ensure secure communication of data to HES.
- j) The equipment shall be weatherproof, dustproof and constructed for outdoor installation on poles (minimum rating: IP-55). A suitable mounting provision shall be made for the equipment.
- k) Enclosure: Provision for security sealing shall be provided and in case the gasket of the cover is used for protection against moisture, dust and insects, the gasket shall be made of weather and aging resistant material.
- l) The list of standards followed in all the devices/equipment used in communication network shall be furnished.
- m) Routers / Access Points shall have suitable power supply arrangements. Provision of battery backup for at least 4 hour shall be there to continue operation in case of power supply failure. The life expectancy of battery shall be 5 years or more.

II. Configuration, Functionality & Interface

Access points shall have following configuration functionalities:

- a) It shall be able to configure the communication with underlying nodes/end points.
- b) It shall support on demand read and ping of individual/group of meters.
- c) It shall push events like tamper, power off etc. to HES immediately on occurrence/receipt from field devices/meters.
- d) It shall have Wide Area Network (WAN) connectivity to the HES through suitable means.
- e) It shall communicate with routers/nodes/end points on RF mesh (license free band).
- f) It shall periodically monitor meter reads/downstream commands and shall retry and reconnect in case of failed events/reads.
- g) After power Interruption, on restoration of power supply, it shall establish communication with underlying devices as well as upstream application (HES) automatically.
- h) Access point shall facilitate recording of
 - No of packet failures
 - Retry attempts
 - Missed periodic reading
 - Failure to connect
 - Tamper events
- i) It shall be capable to handle interval data of suitable nos. of any type of smart meter (1ph/3ph). Access point shall be able to acquire and send data to HES for full capacity (No. of meters/field devices it is designed for) within a suitable time period to achieve the performance level. Full capacity of access point is required to be indicated in the offer.
- j) Access point shall support remote firmware upgrades as well as remote configuration from the control center.

III. Testing of the DCU /Access Point

- a) DCU/Access Point shall be tested for the following
 - Radio interference measurement (CIS PR 22)
 - Surge test (IEC 610004-5)
 - Fast transient burst test (IEC 61000-4-4)
 - Test of immunity to electrostatic discharges (IEC 61000-4-2)
 - Test of immunity to electromagnetic HF field (IEC 61000-4-3)

- b) Resistance to heat and fire
- c) The bidder shall provide IP-55 compliance test certificate for DUC/Access Point.

8. Head End System (HES)

The bidder shall provide the HES suitable to support the collection and storage of data as per performance level for 11.25 Lakh smart meters scalable up to 20 Lakh smart meters. The bidder shall supply and commission one HES that shall have the capability of storing APIs from minimum 5 meter manufacturers thereby allowing data exchange with minimum 5 meter manufacturers. All meter data of 15 minute blocks shall be polled once every 24 hours. The duration to polling frequency shall be remotely configurable and can be altered as per the requirement of RECPDCL.

- a) The main objective of HES is to acquire meter data automatically avoiding any human intervention and monitor parameters acquired from meters.
- b) The Bidder shall provide the HES suitable to support the collection and storage of data as per performance level for a defined no. of smart meters with facility of future expansion as per the requirement of the utility.
- c) The no of smart meters/future expansion may be provided by utility as per their requirement
- d) HES would perform all the requisite functions as per the defined functionalities of AMI and it is the responsibility of the Bidder/ System Integrator to supply the requisite software and hardware to achieve the defined functionalities of AMI. HES shall ensure data integrity checks, for example, checksum, time check, pulse, overflow, etc. on all metered data.
- e) HES shall be developed on open platform based on distributed architecture for scalability without degradation of the performance using additional hardware. HES shall support storage of raw meter data, alarms and alerts for minimum 3 days. Adequate data base and security features for storage of data at HES need to be ensured.
- f) The suggested functions of HES (not exhaustive) may be:
 - Acquisition of meter data on demand & at user selectable periodicity
 - Two way communication with meter/ DCU
 - Signals for connect & disconnect of switches present in end points like meter
 - Audit trail and Event & Alarm Logging
 - Encryption of data for secure communication
 - Maintain time sync with DCU / meter
 - Store raw data for defined duration
 - Handling of Control signals / event messages on priority
 - Setting of Smart meter configurable parameters
 - Communication device status and history
 - Network information in case more than one technology is deployed in field between the two devices
 - Critical and non-critical reporting functionality. The suggestive critical events may be alarms and event log for meter events like tamper/power failures etc., if data is not received from DCU/Meter, if relay does not operate for connect / disconnect or there is communication link failure with DCU/Meter or network failure while non-critical events may be retry attempts on communication failure, periodic reading missing and failure to connect etc.

g) Configuration:

HES shall facilitate programming of following meter parameters:

- Load profile capture period
- Demand integration period
- Setting of parameters for time of day (TOD/TOU) billing
- Prepaid function
- Net metering
- Billing date

- Clock setting/time synchronization
- Load curtailment limit
- Event setting for connect/disconnect
- Number of auto reconnection attempt
- Time interval between auto reconnection attempt
- Lock out period for relay
- Remote firmware upgrade
- Password setting
- Push schedule
- Setting threshold limits for monitored parameters
- Provision for adding more programming features in future

The bidder may suggest more parameters as per the requirement

h) Integration

HES shall preferably interface with MDM on standard interfaces and the data exchange models and interfaces shall comply with CIM / XML / IEC 61968 or any other open standard. The solution shall be Service Oriented Architecture (SOA) enabled.

The HES shall provide the means to monitor the network's status from end-to-end and the status of each and every device (signal strength, dynamic status of links with Colour-codes, throughput, available bandwidth etc.) in the network in real-time, and provide performance and activity statistics. The NMS shall support at least SNMPv2. Additionally, the Hardware for the Network Management System is expected from the bidder. Bidder to provide complete configuration of hardware and software with pricing schedule of individual items. Head End System should be fully redundant and in hot standby mode. Standby HES system should be commissioned at DC.

i) Hardware sizing:

a) Bidder to provide the sizing of necessary hardware and software required to implement AMI for 2.0 Lakh meters and must be scalable to 20 Lakh meters. Front end devices and backend IT systems should be sized to 2.0 Lakh meters scalable to 20 Lakh consumers.

b) List of preferable hardware / software is listed below for reference.

- Head End System (HES) software
- ORACLE Utilities Meter Data Management(existing MDM to be upgraded) capable of processing raw data, building of desired analytics like giving demand response signal, taking control / programming actions based on pre-set logic, interface with billing software being used by utility.
- Data archiving and SAN management software
- Centralized network management software along with patch management & identity management
- Antivirus software for all machines in control center.
- Application and database Server suitable for HES, MDMS, along with operating system.
- Application server with minimum 8GB RAM for development, quality and testing.
- Web Server for accessing Head End System
- SAN based storage for storing Smart Meter data, data from MDMS for 5 years with expansion capability upto 20 Lakh meters, to cater 2,00,000 Nos of meters data requirement.
- Data Archiving Server (To retain data for 10 years of period) and Application
- Network management server with patch and identity management
- Firewall

- Routers
- LAN Switch

9. METER DATA MANAGEMENT SYSTEM (MDMS)

JKPDD has already implemented Oracle Utilities Meter Data management System under RAPDRP Scheme. Same should be upgraded to latest version in order to meet the required functionality as defined in AMI functionality document released by CEA until unless specified otherwise in RFP document.

10. DESIGN CONSIDERATION FOR AMI SOLUTION

The bidder shall adhere to the following design principles while designing the AMI solution for JKPDD:

I. Open and Industry Standards for Interoperability

The proposed solution must have highest degree of interoperability and the solution components shall be standard based and adopt an open approach rather than support a specific technology or vendor.

II. Service Oriented Architecture (SOA):

AMI solution components must follow SOA principles to provide specific services using well defined interfaces. The AMI solution design shall be based on cross-functional components or subsystems and shall be implemented in such a way that there is an opportunity for reuse. The integration architecture shall be based on the concept of a service so all the applications of the AMI solution are able to integrate without any complexity.

III. Design principles for AMI solution integration

- a) The integration middleware should be based on Service Oriented Architecture (SOA) and other forms of Application Program Interfaces (API) and use publish / subscribe mechanism.
- b) The integration middleware to be an open architecture based.
- c) Implementation and configuration of functional APIs from meter manufacturers and configuration of head end system
- d) All meter data of 15 minute blocks shall be polled once every 24 hours. The duration to polling frequency shall be remotely configurable and can be altered as per the requirement of RECPDCL/JKPDD.
- e) Bidder must store and manage the security information related to Smart Meters. This include Device Security keys and asset information for processing further business flows.
- f) The solution must support the mass receipt (up to 20 Lakh AMI meters every day) and the update of MDMS with the necessary asset information to complete meter reading and billing.
- g) The bidder shall configure, receive and store the AMI meter test data and asset status as received from AMI meter manufacturer, or as captured by meter testing systems, including the certificates from issuing authorities.
- h) The integration middleware/interface must validate the Data to be integrated.
- i) It must maintain integration logs that confirm the success or otherwise of the interface, complete with control totals
- j) The integration mechanism adopted must have minimal impact on the existing systems. The access to data will only be through business rules i.e. the applications will not access data directly without going through APIs managed by business rules/validation/workflow.

Duration of Project:

Bidder to complete 100% installation including integration of MDMS during Implementation stage of 18 Months after award of contract. Bidders shall provide Warranty including FMS for a period of 60 months post implementation and Go-live).

Bidder should also provide all the updates free of cost during warranty and FMS period. Bidder should also provide the required training to the users for operating, developing system and administrative training to selective persons for running system after support period free of cost.

Bidder has to provide all the supporting 3rd party software which it recommends for operation of the system free of cost till the FMS period.

- Any software updates, upgrades, patches released till the completion of warranty period shall be supplied, installed and commissioned under scope of agreement / PO / RC. Training to JKPDD employees on software from the OEM or OEM's certified training partner shall be arranged by the bidder. Bidder shall maintain the software on 24X7 basis during and after warranty period as per agreed SLA.
- The Software licenses will be in the name of JKPDD and will be perpetual in nature.
- System will operate in English (British / US) language.
- System should have a reporting system in GUI form which can plot any report using different parameters of meters for user analysis purpose.

Bidder to provide software upgrades till FMS period to ensure smooth working without additional cost to JKPDD.

11. Mobile App and Web Portal for Customer

The implementation partner(s) shall provide a website portal and a mobile application (for smartphone and tablet devices using latest and commonly available browsers and operating systems and platforms) using which customer can readily access to the features extended by AMI. This portal/app and shall be part of the complete system and therefore no additional cost shall be payable for upgradation/maintenance separately. A registration process shall be provided to assure that customer access is limited to authorized users of a given account. The portal shall provide useful data in an easily understood format, for the purposes of informing customers about actual usage.

Both the mobile app and web portal shall support all device form factors like mobile, tablet, desktop etc. through a responsive screen. It shall be Operating System and device agnostic.

Following shall be the features supported by Mobile app:

- a) It shall work on all mobile and tablet form factors by recognizing the device details automatically.
- b) It shall be OS agnostic (at least all standard OS like iOS, Android, Blackberry, and Windows)
- c) It shall work on all standard browsers like IE, Chrome, Safari, Firefox etc.
- d) Support for dial to call feature from a page.
- e) It shall support multiple languages.
- f) It shall be possible to make on-the-fly changes to the portal through a UI and immediately make these available to citizens.
- g) The user experience of the citizen on the Mobile Portal and App shall be similar in terms of look and feel, navigation, menu and access to preferences and other data.

- h) It shall have search functionality across all the pages.

Low bandwidth support - A mobile portal as well as apps shall be able to provide services at low bandwidths also. For this, the mobile app and portals shall be tuned for low bandwidths to facilitate access of services by users when bandwidth is low.

Functional requirements for Web portal/mobile app are mentioned below:

- a) The portal/app shall have a landing Home page. This page shall provide a brief description about the DISCOM, any promotional features or advertisement for special programs can be placed in this page. Login Component is provided and registered users may login using their username and password. New Users can also register by clicking on the First Time Users Register link. The Forgot Password link helps the user to retrieve their password. New users can register by providing their personal information and setting up of security answers. Forgot passwords can be retrieved or reset using OTP through registered mobile number or through email address. The registered users can change their password and account information as well as registered mobile number through OTP feature.
- b) The portal/app shall have the ability to display single/multiple account information of the users displaying information like account name, address, balance, due, status etc. Any status message pertaining to the account/s viz. alerts/actions shall be displayed here. Information about different customer engagement programs viz DSM etc. shall be displayed here. The portal/app shall have the ability to display consumption history of the user in graphical formats for at least 12 months. A more detailed analysis is provided in a tabular format listing the meter reading date, the reading, consumption, number of days, charges etc.
- c) The portal/app shall have the ability to provide option for registering in online/paper billing to the customer. There shall be a bill summary page that shall display bill information in summary and also option for detailed view and download in pdf format if required by customer. The user shall be able to pay bill for single and multiple accounts.
- d) The portal/app shall have the ability to provide option for recording service requests/complaints lodged by the customer as new connection, disconnection, load change, name change, category change, meter shifting etc. The user can view the service request status. The user can register complaints viz. power failure, faulty meter, street light outage etc.
- e) After meter installation, customer identification no., meter ID, its hardware & software configuration, name plate details, make, type i.e. 1 Phase or 3 Phase, etc. (as per requirement of DISCOM) shall be updated in HES/MDMS. This information would also be updated on the portal/app for providing information to consumers.
- f) The MDMS shall support the web portal or shall have the ability to interface with the 3rd party portal/DISCOM portal to provide the consumer near real time online views of both usage and cost and helping consumers to understand electricity usage and cost information, alerts and notifications and energy savings tips with different levels of detail. The portal shall support the view for past electricity usage, last week's, yesterday's, current days or other period etc. as per selection. The portal shall provide user friendly access to consumer for their data via colourful graphs and charts and can download the data into a spreadsheet.
- g) The mobile app/portal will have the ability to allow registration for prepayment customers and display connection parameters of the existing users.
- h) The portal/app shall also provide platform for implementation of peak load management functionality by providing existing tariff & incentives rates, participation options etc. The portal/app shall also have the ability to provide customers with interval data, flags, voltage, power quality indications etc.

- i) The portal/app shall provide customers with access to current and historical consumption and interval data, outage flags, voltage and power quality indications. The Customer may also access data through customer portal. The solution shall integrate via a user friendly graphical interface.
- j) The portal/MDMS shall support email/SMS notification of configured alarms & events to selected users.
- k) The web portal or 3rd party portal/utility portal to provide the consumer near real time online views of both usage and cost, helping consumers to understand electricity usage and cost information, alerts and notifications and energy savings tips with different levels of detail. The portal shall support the view for past electricity usage, last week's, yesterdays, current days or other period etc. as per selection. The portal shall provide user friendly access to consumer for their data via colorful graphs and charts and can download the data into a spreadsheet.
- l) Consumer mobile app through which consumer shall be able to log in through android/iOS/Window based mobile app to see information related to its energy consumption. App shall also provide platform for implementation of peak load management functionality by providing existing tariff & incentives rates, participation options etc.
- m) User interface to consumer portal to access consumer's data from MDMS for all authorized consumers shall have ability for at least the following functionality:
 - i. View metered data, initiate and view reports
 - ii. View data according to Time of Use(ToU) tariff
 - iii. Can make request for connection/disconnection
 - iv. User can update mobile number/email
 - v. Can initiate service requests for maximum demand updating, meter checking etc.
 - vi. In case on net-metering consumers, user can view data for both import & export
 - vii. In case of prepaid consumers, consumers can view recharge history & present balance.
 - viii. Prepaid consumers shall be provided facility to recharge their account by logging on user interface.

User interface shall require consumer id., mobile number & password for secure login. This user interface shall be integrated with the present online payment gateway of utility.

Integration with DISCOMs Existing SMS Gateway

The bidder will provide the facility to send transactional SMS to registered mobiles of DISCOM's consumer with accuracy (mobile number shall not be mismatched). The AMI Implementing Partner shall integrate the AMI solution with the existing SMS gateway of JKPDD DISCOMs for sending and receiving SMSs.

A. SERVICE LEVEL AGREEMENT (SLA) & PENALTY

Following SLA will be applicable during and after warranty period under FMS

- These performance levels shall apply to the complete AMI system.
- AMI system include the communications links provided by Network Provider /third parties such as telecommunications companies and bidder has to ensure the desired performance level.
- The performance levels exclude force majeure events. For SLA calculation all exceptional cases not attributable to contractor like – power failure, Communication through SIM provided by JKPDD, power quality, sabotage, defective / disconnected meter will be excluded from the calculation.

The following are the required performance levels for an AMI Systems, which should be met on a daily basis-

TABLE 1 AMI SYSTEM SLA

Data Type	Performance Requirement	Penalty
1. Scheduled Interval data readings at a fixed periodicity during the day as decided by utility		
Periodic collection of the 30-minute block profile data after every 60 minutes	From 95% of meters within 5 minutes	As per Table 2 Penalty Table for SLA
	From 98% of meters before next periodic packet is scheduled.	As per Table 2 Penalty Table for SLA
2. Scheduled daily meter readings (as per IS 16444/15959)		
Daily collection of the previous day's interval energy data and total accumulated energy	From 95% of meters within 8 hours after midnight; and	As per Table 2 Penalty Table for SLA
	From 99% of meters within 24 hours after midnight	As per Table 2 Penalty Table for SLA
3. Scheduled billing/ load profile data for bill period		
Collection of billing/load profile data for the bill period for entire installed population	From 95% of meters within 24 hours after midnight; and	As per Table 2 Penalty Table for SLA
	From 99% of meters within 48 hours after midnight	As per Table 2 Penalty Table for SLA
4. On-Demand Remote reads of meters		
Collection of 7 days of interval energy data and the current total accumulated energy from a group of 1000 AMI meters	Action performed at 90% of meters within 1 Hour; and	As per Table 2 Penalty Table for SLA
	Action performed at 95% of meters within 2 hours; and	As per Table 2 Penalty Table for SLA
	Action performed at 99% of meters within 6 hours	As per Table 2 Penalty Table for SLA
Collection of 7 days of interval energy data and the current total accumulated energy from a selected individual meter	Action performed within 60 seconds	As per Table 2 Penalty Table for SLA
5. Updating of data on consumer portal/ app		
Updating of individual consumer data on portal/ app after receiving the data in MDM	Action performed for active consumers within 5 minutes after receiving the data in MDM	

Data Type	Performance Requirement	Penalty
	Action performed at 99.5% of meters within 2 hours after receiving the data in MDM.	
6. Ping Response with acknowledgement/ response for selected meters		
For a group of 1000 meters	Action performed at 99% of meters within 5 minute; and	As per Table 2 Penalty Table for SLA
For an individual meter	Action performed within 30 seconds	
7. Remote load control commands for selected meters with acknowledgement/ response for selected meters		
For a group of maximum of 1000 AMI meters	Action performed at 95% of meters within 5 minutes; and	As per Table 2 Penalty Table for SLA
	Action performed at 99% of meters within 10 Minutes	As per Table 2 Penalty Table for SLA
For an individual meter	Action performed within 30 seconds	
8. For remote connect/disconnect with acknowledgement/ response for selected meters		
For a group of maximum of 1000 AMI meters	Action performed at 90% of meters within 10 minutes; and	As per Table 2 Penalty Table for SLA
	Action performed at 95% of meters within 60 minutes; and	As per Table 2 Penalty Table for SLA
	Action performed 99% of meters within 120 minutes	As per Table 2 Penalty Table for SLA
For an individual meter	Action performed within 30 seconds	
9. Meter loss and restoration of supply		
Receiving of alert for affected AMI meters	Alert to be received within 5 minutes for 60% of meters	As per Table 2 Penalty Table for SLA
10. Meter Tamper Alerts		
Receiving of alert for an individual meter	Alert to be received within 5 minutes	As per Table 2 Penalty Table for SLA
11. Power Quality Alerts		
Receiving of alert for an individual meter	Alert to be received within 5 minutes	As per Table 2 Penalty Table for SLA
12. Remotely altering settings in meter/ firmware upgrade with acknowledgement/ response for selected meters		
For a group of 1000 AMI meters	Action performed at 95% of meters within 24 Hours; and	As per Table 2 Penalty Table for SLA
	Action performed at 99% of meters within 36 Hours	As per Table 2 Penalty Table for SLA
13. Remotely read events logs		
For reading the full event log for a group of 1000 AMI meters	Action performed at 90% of meters within 30 minutes; and	As per Table 2 Penalty Table for SLA
	Action performed at 95% of meters within 1 hour; and	As per Table 2 Penalty Table for SLA
	Action performed at 99% of meters within 6 hours.	As per Table 2 Penalty Table for SLA

For the above performance requirement, a designated team/ person from RECPDCL/JKPDD will review the performance of supplier against the SLA after every 90 days. Post evaluation, an audit report of the same will be submitted by the AMI Implementation Agency to the RECPDCL/JKPDD

Further, for meeting SLAs as defined above (except SLA number 4), MDMS should be able to generate standard reports for these parameters. During performance evaluation, the generated reports shall be randomly checked with data by the designated team/ person from RECPDCL/JKPDD.

Applicable Penalty

The following operational penalties shall be applicable on the basis of SLA Parameters on the Bidder and shall be calculated as here under:

TABLE 2 PENALTY TABLE FOR SLA

Sr. No.	Particular	Extent of penalty / No Payment
1	>=99%	No penalty
2	>= 90% to < 99%*	No payment towards non-reporting consumer Meters. Additionally, penalty at the rate of percentage by which the SLA falls below 99% shall be deducted from the monthly invoice of the vendor.
3	Below 90 %	No payment shall be made

* for e.g. - If communicated meter per lot per month are 91% then the bidder shall be paid 91% of O&M cost minus (-) 8% (difference from 99%) of O&M cost, penalty on the invoice value.

Note:

- (i) The bidder shall ensure 100% data availability for billing and none of the consumers shall be billed on average for two consecutive billing cycles.
- (ii) The firm shall furnish the communication report as per SLA along with the payment invoices. The HES/NMS should have such feature to get date and time wise report meter communication status.
- (iii) The designated officer of the utility shall verify and certify the invoice through system generated reports; bidder shall provide an interface for verification of the invoice in the software to facilitate the verification authority to compute the availability of meter data on system and amount of applicable penalty.
- (iv) If the defective or damaged materials are not replaced within 15 days from the date of receipt of the intimation from the RECPDCL/JKPDD of such defects or damages, then a penalty of 0.5% per week or part thereof, subject to maximum 10% of O&M/FMS cost of that material in addition to SLA shall be applicable.
- (v) Integration Providing Consumer meter consumption data in a desired template of the DISCOM System approved by RECPDCL/JKPDD.
- (vi) All percentages for SLA are to be calculated over monthly. Average of three months will be taken as quarterly performance.

1. Maintenance & Support services

1.1.Introduction

The scope of maintenance work shall include a comprehensive maintenance of all the software and hardware provided by the contractor for the various systems and components of AMI system under this project. The maintenance practices to be followed shall be as per ISO20000 Standard. The essence of the maintenance services is to provide maintenance support for the designated hardware and software, with the goal of meeting the availability as set forth herein. System Integrator (SI) is to hand hold the EMPLOYER/UTILITY team to take over all maintenance and support services after completion of SI's FMS period. The project/ system devices should allow their functionalities to be upgraded without disruption to the existing functionalities by downloading new software and configuration information.

1.2.Maintenance support

The period of maintenance support shall be the 5 year Warranty (Defect Liability) period commencing from Operational Acceptance and 5 year Maintenance along with warranty.

The nature of maintenance support required for the different type of systems and components are described in the Table 3 Maintenance support and Availability requirements below:

TABLE 3 MAINTENANCE SUPPORT AND AVAILABILITY REQUIREMENTS

Sl.no.	System	System Availability requirements
1	Advanced Metering Infrastructure System (AMI System)	99.5%

The system availability shall be measured for entire System. Similarly, the availability of various systems of AMI elements Hardware and Software, Field devices, Communication & Networking Systems shall be considered separately control Centers wise. Individual device availability shall be at least 98%.

For all third party equipment (Hardware & Software) and services (communications) Contractor shall have back to back support along with supply of spare and service level agreement with appropriate response time from OEM/OEM Authorized representatives. Contractor shall be responsible for coordination with the OEM for all matter related to that equipment. Contractor shall also be responsible for meeting the overall response times and availability requirements specified in RFP.

The maintenance of the System shall be comprehensive and shall comprise of the following category of works which is further elaborated for each of the different subsystems:

- (a) Preventive Maintenance Activity (performance monitoring, system backup, patch management, updates and troubleshooting)
- (b) Maintaining a minimum no. of specified spares.

- (c) Integration of new equipment (Field devices, central systems, Communication & networking systems) and integration of a new or existing central system.

1.2.1. Preventive Maintenance Activity

The preventive maintenance activity shall be performed by the Contractor to keep the system running at optimum level by diagnosis and rectification of all hardware and software issues and would broadly include following.

- There should not be any unnecessary and unscheduled downtime of system services.
- Configuration of the replaced hardware and software, periodic routine checking as part of a preventive maintenance program (as described in further detail in this document) which would include checking of functionality of hardware and software,
- Monitoring of the performance of the system and doing necessary tuning for optimum performance to accommodate any changes such as addition of new components.
- Providing all necessary assistance to Employer/Utility for addition and modification of database and displays, Database sizing activities including Backup and restore of the system
- Restoration of the systems upon its failure and to restore the functioning of the various systems at the central systems
- Log analysis in developing issues

Routine works and other day-to-day operational activity would primarily be the responsibility of Owner and in case of any difficulty in this regard the same shall be referred to the contractor for support.

1.3. Hours of Cover

The Contractor shall provide engineers who have an experience and skill to maintain the Smart Grid System to the desired level of availability. The contractor's on-site support for central systems, shall be standard hours of service i.e. Monday to Saturday- 9:00 am to 5:30 pm local time (IST), excluding public and Owner Company holidays, throughout a year. At least one experienced personnel having expertise in AMI System shall be available during the standard hours of service. The timings for Emergency Support would be 24 hours a day, 7 days a week throughout the year.

The support personnel so deployed shall be qualified personnel having at least 3 years of experience in the delivered AMI elements/parts. The contractor shall submit the CV's and recommendation letter from customers for all support personnel(s) to Employer/Utility for approval before deployment at site. The Employer/Utility can ask the Contractor to replace the personnel deployed for maintenance support if his performance is not found to be satisfactory.

1.4. Service Response requirements

The severity levels are defined in coming sections and the requirement of response time for various severity levels is defined below:

Emergency Support for Severity 1 issues are to be provided 24 hours a day, seven days a week. The on-call support team shall include all key technical competencies so that any aspect of a system failure can be attended. The team shall comprise of experienced technical staff that are skilled in

troubleshooting of the various systems covered under FMS. Severity 1 problems shall be reported by telephone for rapid response; target response times are defined in this section. For severity 1 problems, the key objective is to restore the system to an operational state as quickly as possible, including by a temporary workaround. Resolution of the defect may be completed during standard hours.

Severity 2, 3, and 4 problems shall be reported by Owner/Employer/Utility through a call tracking system to be provided by the contractor. Resolution of problems may also be provided by an individual fix that will be installed by the contractor at no extra cost to Owner.

1.5. Monitoring

The operation and performance of the various systems under FMS shall be monitored on a bi-weekly basis; the contractor shall review the following, analyze the results, and submit report to Owner. The contractor shall conduct at least the following monitoring, for the all Control Centers.

1.6. Log Monitoring

- System logs for a selected day
- System history log
- Aggregate data collection
- Events Collection

During monitoring if any defect/ abnormality is found, the contractor shall undertake corrective maintenance for the same.

1.7. Resource Monitoring

Resource Monitoring services comprises checking the system's major node resources, gather log data, analyze results, and advise Owner/Employer/Utility on the appropriate actions to be taken and undertake any agreed upon actions. The supplied system tools shall be used to continuously collect the following information:

- CPU loading (Peak and Average)
- Memory utilization (Peak and Average)
- Disk utilization (Peak and Average)
- LAN/WAN utilization (Peak and Average)
- Operating system resource utilization
- System error log

The SI shall submit the procedures details to meet the above along with the offer.

1.8. Cyber security System monitoring

The Contractor shall also be responsible for monitoring of the cyber security system, as proposed. The logs of the system shall be analyzed for exceptions and the possible incident of intrusion/trespass shall be informed to the Employer/Utility.

The monitoring shall encompass the various cyber security devices installed at Control Centre such as firewalls, Intrusion prevention system (both network based and host based), routers. The Centralized Monitoring Console (CMC) shall monitor and continuously collect the above logs. The Cyber security system shall also be subjected to Annual Security Audit from CERT-In listed auditors at the cost of the Contractor. Contractor shall implement the recommendations/remedial actions suggested by the Auditor after audit.

1.9. Patch Management

The contractor shall also be responsible for providing updates/patches for the software products supplied under the project. All other patches of third party product like Operating System and Anti-virus shall be tested by the Contractor prior to installing in the Employer/Utility's network. Other products like IPS, Network IPS, Host based IPS, Firewalls shall also be provided with secure patch management. A secure patch management and deployment system is to be established which shall be provided with single point of Internet connectivity. All the patches shall be downloaded through this single point of connection. Internet connection shall also be provided and shall be shown in System Architecture diagram submitted during Bid submission.

Software updates and patches shall be applied while the system is in operation and shall not require a reboot (e.g. applied to one processor in a dual processor configuration). A secure (e.g. https) remote method of initiating a rollback to the software prior to the update or patch shall be provided.

SI to describe the method proposed to securely apply software updates and patches. SI to also specify the method proposed to use to securely initiate a rollback to the software state prior to an update or patch.

The Contractor shall describe a mechanism for patch management so that it is known that what patches have been applied, what all patches are pending but available with us and what is the recent release of patches for the various products as part of cyber security documentation. Any patch shall be applied only with express permission of the Employer/Utility's representative.

1.10. Physical maintenance

The contractor shall undertake physical maintenance of all equipment/modules under the scope of this contract, in accordance with this section. The physical maintenance shall include cleaning, dusting, inspection of equipment for loose connections, damage to insulation, pest infections etc. Equipment shutdown approval for preventive maintenance shall be required from Employer/Utility.

1.11. Spares inventory

The Contractor shall maintain a spares inventory at his own cost to meet the spare availability requirements of the system. The spares shall be used as and when required and no separate charges are payable except the maintenance charges. The Contractor shall decide the items and components to be maintained as spare but a minimum number of spares but not limited to as given **Table below** shall be kept at the respective Centers. This shall be periodically verified by the Employer/Utility. If the replenishment of the spare takes more than 30 days then it will be considered as non-availability as per **Severity-2**.

TABLE 4

S No.	Item Description	Unit	Qty.
A	Servers	Lot	1*
B	Work Station	Lot	1*
C	Routers & Switches	Lot	1*
D	Communication Equip.	Lot	1*
E	Field Devices	Lot	1*
F	Meters DCU and other Field Devices	Lot	1*
* Note: One of each Type Supplied as part of system. Wherever one configuration can replace multiple type of elements supplied only 5% (Minimum) such equipment shall be taken as spare			

(a) Integration of new equipment

All future Field devices & other System integration shall be the responsibility of contractor and shall be part of the maintenance charges without any other additional cost burden to employer/utility.

(b) Problem/Defect Reporting

The SI shall propose an appropriate problem/defect reporting procedure to meet the requirement of all severity level cases along with the offer.

The problems will be categorized as follows:

TABLE 5 SEVERITY LEVELS

Category	Definition
Severity 1 – Urgent	Complete system failure, severe system instability, loss or failure of any major subsystem or system component such as to cause a significant adverse impact to system availability, performance, or operational capability
Severity 2 – Serious	Degradation of services or critical functions such as to Negatively impact system operation. Failure of any redundant system component such that the normal redundancy is lost Non-availability of Man-power at Central system during working hours, non-availability of spares
Severity 3 – Minor	Any other system defect, or unexpected operation not covered under severity 1 or 2
Severity 4 – General/Technical Help	Request for information, technical configuration assistance, "how to" guidance, and enhancement requests.

1.12. Severity levels

The detail of the systems under different severity levels is as below:

1. Severity-1 (Urgent support)

This support is required when there is a complete system failure, severe system instability, the loss/failure of any major sub-system / system or its components, which may significantly impact the system availability, performance, or operational capability at central system. For example, loss of data to the operator due to any problem software/Hardware-related in AMI/SMART GRID System, outage of any important software functionality which is required to discharge operational functions, outage of both main and standby routers, and loss of data exchange with other computer systems or other Central systems would be included under this category. The failure of complete UPS (uninterrupted Power Supply) system resulting into loss of UPS output supply at both Output ACDB is covered under this category.

Upon receiving intimation, the representative of the contractor would immediately attend to the problem. The problem shall be attended by the contractor at the earliest, and it shall arrange all resources and take all steps to restore the data availability and functionality at the earliest.

2. Severity-2

Degradation of services or critical functions such as to negatively impact system operation. Failure of one Data Server, stoppage of data collections for archiving, at the respective Central system, and outage of other applications not covered under severity-1 are included in this category.

Failure of one UPS system, Failure of Battery System and failure of any other system of Auxiliary

Power supply not covered under Severity-1 are included in this category.

Coverage under this severity would be outages that do not immediately cause on line data loss but subsequently could result into Severity-1 category outage, loss of an important subsystem that may affect the day-to-day works and loss of archived data.

Failure of any redundant system component affecting the critical redundancy would also be included in this category.

Non-availability of designated contractor's Man-power at central system as well as required inventory of spares specified here will also be covered under this category.

3. Severity-3 (Standard support)

The support services included under this category are when the outage or loss of functionality is neither of an emergency nor priority functionalities as indicated in severity level 1 or 2 above.

4. Severity-4 (General Technical Help)

Request for information, technical configuration assistance, “how to” guidance, and enhancement requests are included under this category.

1.13. Response and Resolution Time

This section describes the target times within which the contractor should respond to support requests for each category of severity. The Initial Response Time is defined as the period between the initial receipt of the support request (through approved communications channels) and the acknowledgment of the contractor. The Action Resolution Time is the period between the initial response and the contractor delivering a solution. This period includes investigation time and consideration of alternative courses of action to remedy the situation. The Action is defined as a direct solution or a workaround.

TABLE 6: SUPPORT RESPONSE/RESOLUTION TIME

Severity	Initial Response time(Working Hours)	Initial Response Time(Non - working	Action Resolution Time	Action
1	5 minutes	30 minutes	2 hours	An urgent or emergency situation requiring continuous attention from necessary support staff until system operation is restored – may be by workaround.
2	5 minutes	2 Hours	24 Hours	Attempt to find a solution acceptable to Owner/ Employer/Utility (dependent on reproducibility), as quickly as practical.
3	2 hours	1 day	2 days	Evaluation and action plan. Resolution time is dependent on reproducibility, ability to gather data, and Owner/ Employer/Utility's prioritization. Resolution may be by workaround.
4	2 hours	1 day	2 days	Report on the problem/query is to be furnished.

(c) Availability and maintenance charges payment Calculation

It is the endeavor of both the contractor and Owner to maximize system availability to the extent possible. The contractor shall provide guaranteed availability for various types of Severity levels as specified in section above.

The non-availability hours for availability calculation shall be counted from the end of the allowed Action Resolution time. A standardized register shall be maintained at each site containing full details of each outages, actions taken by Owner to correct the problem, applicable Severity level, time of reporting to the contractor support engineer/support center pursuant to the appropriate

methods in the Agreement, allowed Response time as per the Response times defined in above section, actual Resolution time, and signature of Engineer-in-charge as well as the contractor's support engineer of the site.

Duration of outages over and above the Action Resolution time in each of the Severity levels shall be counted for the non-availability computation and shall be clearly brought out in the register. The resolution may be accomplished by a work around, and such solution shall mark the end of non-availability.

In the event of multiple failures at a site, due to a common cause, the first FPR (Field Problem, Report) logged shall be used for the purpose of availability calculation.

1.14. Availability computation for System

Availability computation shall be done on per quarter per site basis. The formula to be used for availability computation shall be as under:

$$\text{Availability per quarter (per site)} = \frac{\text{THQ} - (S1 \times 1 + S2 \times 0.8 + S3 \times 0.5)}{100\% \text{ THQ}}$$

Where THQ is total hours in the quarter

S1 is the total non-available hours in Severity Level-1

S2 is the total non-available hours in Severity Level-2

S3 is the total non-available hours in Severity Level -3

1.15. Payment of maintenance charges (based on AMI availability)

In the event of availability below a certain level, the maintenance charges would be proportionately reduced as follows: The same shall be applicable for the Auxiliary Power supply system with the availability specified for the respective systems.

For Software:

Availability of central system / quarter	Deduction as % of the apportioned price of total FMS (Software Portion) for central system portion of the contract applicable (quarterly software price)
99.5% - 95%	Deduction of 2% of the apportioned quarterly FMS charges for every 0.5% or part there of decrease in availability under 99.5%.
< 99.5%	Deduction of 5% of the apportioned quarterly FMS charges for every 0.5% or part there of decrease in availability under 99.5%.

For Hardware:

Availability for each elements per quarter	Deduction as % of the apportioned price of total FMS (Hardware portion) for central system portion of the contract applicable for that site (quarterly hardware price)
>98%	NIL
98% - 95%	Deduction of 2% of the apportioned quarterly FMS charges for every
< 95%	Deduction of 5% of the apportioned quarterly FMS charges for every

For Communication:

Availability for each elements per quarter	Deduction as % of the apportioned price of total FMS for central system portion of the contract applicable for that site (quarterly hardware price)
>98%	NIL
98% - 95%	Deduction of 2% of the apportioned quarterly FMS charges for every
< 95%	Deduction of 5% of the apportioned quarterly FMS charges for every

Total maximum deduction shall be limited to 20% of FMS charges.

1.16. Computation of Availability / Non-availability

The computation of Availability / Non-availability would be rounded up to 2 decimal places on quarterly basis and any deduction in the maintenance charges thereof would be calculated as stated above in aforementioned Section on pro-rata basis.

1.17. Contractor's Obligations

In order to optimize and improve the response of the system, the contractor may re-install the program modules in consultation with and after making the Owner / Employer/Utility engineer aware of the consequence (like data loss, database rebuild etc.)

Any modification of Field devices, software/Operating System required to restore functionality due to hardware upgrades, patches, or arising out of a necessity to fix FPRs (Field problem reports), would be done by the contractor at no extra cost to Owner / Employer/Utility.

The contractor will submit FSR (Field Service Report) and the steps taken to solve the problem, along with details of code changes.

1.18. Responsibilities of Owner /Employer/Utility

The responsibilities of the owner during the maintenance period are as follows:

- (a) Employer/Utility shall ensure that proper Environmental conditions are maintained for the system.
- (b) Employer/Utility shall ensure that the System is kept and operated in a proper and prudent manner as described in the system documentation provided by the Contractor and only trained Employer/Utility representatives (or persons under their supervision) are allowed to operate the system.
- (c) Employer/Utility shall provide access to the sites of installation for purposes of providing Support Services.
- (d) Employer/Utility shall provide the contractor with Space for Office for their maintenance staff and storage for spares.

1.18.1. Responsibility Matrix

The table in this section provides a summary definition of the roles and responsibilities of the contractor.

TABLE 7 RESPONSIBILITY MATRIX

Item	Task
0.0	PROBLEM IDENTIFICATION

0.1	Root cause analysis to determine whether the fault is attributable to Hardware or Software.
0.2	Resolution of problems involving third party maintainer where there is uncertainty whether the root cause is hardware or software.
1.0	SOFTWARE PROBLEM RESOLUTION
1.1	Report problem and assist with problem identification
1.2	Provide or recommend corrections, temporary patches, workarounds or other fixes to system problems
1.3	Install and test corrections, temporary patches, workarounds or other fixes to system problems
2.0	ROUTINE SOFTWARE SUPPORT
2.1	Build and maintain database, displays and reports
2.2	Perform system back-ups
2.3	Restore or reinstall software from back-ups
2.4	Monitor system logs (part of remote monitoring service)
2.5	Maintain system logs
2.6	Maintain user accounts
3.0	HARDWARE PROBLEM RESOLUTION
3.1	Report problem and assist with defining problem
3.2	Troubleshoot problem to diagnose if it is software-related or hardware-related
3.3	Identify failed component, Replace failed components in online system using parts from spares inventory
3.4	Restore operation of repaired/replaced equipment
4.0	HARDWARE SPARE PARTS
4.1	Manage local spares inventory
4.2	Provide appropriate facility for local storage of spares
4.3	Replenish local spares inventory
5.0	Integration and database work
5.1	FEP Card addition/Expansion
5.2	Database resizing

B. General scope of work

1. For the maintenance phase, selected bidder to dedicatedly post complete project management team comprising 01 Project manager (B. Tech / B. E. in Electrical Engineering with at-least 8-10 years relevant experience) and 05 support engineers (Diploma/Degree in Electrical Engineering with at-least 5 years relevant experience) per region (Jammu City & Srinagar City) for resolving field related matters for application management and overall system maintenance.
2. User Acceptance Testing and Sign-Off from JKPDD would require for declaration of Go-Live. RECPDCL will provide necessary support for coordination with JKPDD.
3. Bidders to provide complete year wise plan for resource deployment post implementation phase.
4. Selected Bidder to setup a Project Management Office in both the region (Jammu city & Srinagar city) within 30 days from the date of award of contract. This office shall remain operational till the successful completion of this project i.e. Implementation stage (18 Months), Warranty & FMS Stage (60 months post implementation and Go-live). All the dedicated resources are to be deployed in in both the region (Jammu city & Srinagar city) for day-to-day coordination with Utility.
5. Packaging and transportation from the manufacturer's work to the site including ports and customs clearance will be borne by the bidder.
6. Insurance of all equipment from manufacturer's site till installation, commissioning, handing over and user acceptance will be borne by the bidder.
7. Maintain the mandatory and recommended (a minimum of 5%) spares during warranty and FMS period and provide the list of the same. On competition of warranty/FMS period, bidder to hand over all spares to JKPDD in working condition.
8. Install the equipment, obtain JKPDD acceptance and submit a copy of the same to designated authority of RECPDCL.
9. Post completion of installation and commissioning works, the selected bidder shall provide a complete and final location table and spreadsheet indicating all locations including all the relevant following information.
10. The bidder shall make his own necessary arrangements for the following and for those not listed anywhere else:
 - Office and store.
 - Transportation.
 - Boarding & lodging arrangement for their personnel.
11. Technical Specifications of various type AMI equipment, Hardware & Software shall have full compliance with NSGM, CEA, BIS, MoP guidelines and latest applicable amendment. However, any higher specifications are acceptable in case of any technical specification has become obsolete.

12. Software Solution:

Software should provide following unique features:

1. Collects, archives and analyses collected parameter from all sites.
2. Can handle thousands of remote sites.

3. Multiple users are able to view the data in required formats for graphs, trends, tables and reports. This enables better monitoring and control of transformers.
4. Can be customized based on number of AMI installed and number of user clients.
5. Each user can be assigned individual passwords and rights.
6. Graphic user interface.
7. View all parameters and reports via web clients.
8. Trends.
9. Alarms and events
10. required log sheets
11. Required reports can be configured by the user.
12. Send alarm messages via e-mails to pre-defined users in case on events.
13. Send reports to pre-defined user at set intervals.
14. Results in saving capital equipment by early detection of expected faults.
15. Detect energy loss based on energy through DT and actual energy billed.
16. Shows Vector Diagram
17. Meter Data in different GUIs.
18. User defined GUI reports should be there.

13. SPECIAL TOOLS AND ACCESSORIES

- i The bidder's proposal shall include the list of special tools, testing equipments and accessories required during development stage, for day to day operation and maintenance of the system.
 - ii The bidder's proposal shall include the list of special tools, testing equipment and accessories required for day to day operation and maintenance of the system. All such tools shall be supplied by the bidder. The bidder should clearly bring out the list of such tools in their technical proposal. However, the prices of these special tools shall be included in the related equipment price in the price template given in this RFP.
-
- i Post Go-Live, the software vendor shall provide support to fix any bug related to implementation. The entire system would be considered as successfully installed when the software will run with actual live data at site for 3 months without any reported bugs and start of warranty period. (Bug is lacunae in the system that prevents/ delays an operation or performs a function within the system at suboptimal level/ at performance level lesser than that specified in this specification or provides incorrect operational data or provides incorrect results in any data format in the reports generated by the users). Successful running of system without any reported bug for 3 months shall signify completion of acceptance and start of warranty period.
 - ii Demonstration of all the features of latest version of software; Acceptance testing of the system thus implemented to the owner's satisfaction.

14. TESTING, COMMISSION AND SUCCESSFUL OPERATION

The scope includes testing and commissioning & implementation of all equipment, sub-systems and systems of the project and putting them into successful technical & commercial operation. The scope shall include but not limited to the requirements given

elsewhere in the specification. The bidder shall be responsible to provide all necessary testing and commissioning personnel, tools/kits, test equipment etc.

15. INTEGRATION SCOPE

All required external systems shall be integrated on a continuous basis using an integration middleware layer. The integration is expected to be on on-line real time basis or batch mode where appropriate and shall operate in an automated fashion without manual intervention.

The scope of external integration will be, but not limited to:

- Integration with other existing Applications.
- The integration may use a continuous integration middleware layer as specified by the vendor. This integration middleware layer could then be used to undertake any future integration between applications. The integration middleware shall be based on Service Oriented Architecture (SOA) and shall use publish / subscribe mechanism. Purchaser does not want to build and maintain point to point integration.
- The integration middleware shall be open architecture based.
- Data to be integrated must be validated by the developed interfaces.
- The data to be integrated will be mapped, transformed (if required) and reconciled automatically.
- All interfaces are to be self-checking so that any exceptions or data validation errors are reported by the system. In addition, integration logs should be maintained that confirm the success or otherwise of the interface, complete with control totals.
- The mapping should be manageable through a GUI based administrative interface

16. TRAINING FOR THE EMPLOYEES -

The vendor shall be required to organize following training for the owner's personnel.

The bidder shall provide training to various user groups nominated by JKPDD. The bidder shall provide the Training Approach in the response. The training modules shall include but not limited to –

- AMI Application Administration & Configuration
- AMI/AMI Installation and Trouble-Shooting
- Smart meter installation and communication
- HES and its user interface
- MDMS and its user interface
- Mobile app/Web Portal
- Cyber Security
- Application Management
- Application Data Analysis

Training arrangements – All trainings must be of minimum 1 day or bidder can propose more no. of days training along with batch size as per requirement. A training calendar with contents and sessions will be also agreed upon between bidder and RECPDCL/JKPDD. The selected bidder shall be required to organize following training for the JKPDD/RECPDCL personnel: -

Professional Training - This is the training for the core Group of implementation team of the JKPDD and RECPDCL/JKPDD. This team will comprise of members from all the Business Functions and IT sections.

Each member would be trained in the relevant function / module. This Training would be required to be given to approximately 35 personnel in Jammu & Kashmir each. It is the responsibility of implementation agency to deliver this training. Standard curriculum, designed and agreed by the owner for hardware, software and network preferably from the OEM partner or OEM's certified training partner shall be arranged for each group. The vendor is required to quote on per person basis for this training. The Purchaser will prefer if a portion of the training is conducted on-site.

End User Training - The bidder will provide training to the owner's team on a "Train the Trainer" basis. The Owner's team so trained will then train all of the owner's end users. It is estimated that this training will require around 8 groups, with each group comprising of around 15 persons. These training sessions will be required to be conducted at any of the sites.

The recommended training material can be in paper / electronic media with courses on BPA software fundamentals, business process overview, job activity training, and delivery options being on-line, CBTs, instructor led class rooms, etc.

During the course of the implementation, the bidder is expected to complete / be involved in the following activities in terms of skill transfer:

- Testing scripts should be prepared to test the business processes and scenarios of the new system.
- The project team members will further develop these testing scripts into training documents.
- Training material will be organized by functional process that will serve as the training documentation for a particular functional area.
- Assist the Owner's team members in creating procedure documents for use in conjunction with the other training material. A procedure document will list all of the transactions necessary to complete a business scenario whereas a training document lists the steps to execute a transaction. Each step will be a transaction referenced in a training document.
- Procedures will be listed for all the online steps needed to complete a scenario.
- In addition to functional training document binders and procedures, the project team members will create training courses and exercises. The training courses will contain all the training documents and necessary to train an end-user in his / her role. The training exercises will list common business scenarios and input data that the user will enter to practice with the newly developed BPA software.
- Vendor will assist in administering training to project team members and / or power users, to "train the trainers".
- Vendor should assist in administering training to the rest of the users / peers in functional areas based on the course documentation developed by the project team and vendor.

The training will consist of a curriculum of courses to address the issues of system operation, business-wide application, changed business processes and general use of the new system.

Representatives from the successful vendor, Purchaser's implementation project and change management teams will be involved throughout in the development of training strategy, training material

design and development, standards and training delivery to ensure that change management issues are incorporated, and that training strategies and materials are aligned to the requirements of the project and as business-specific as possible.

The roll out of the training program will be coordinated with the overall project implementation strategy.

17. SUPPLY OF MEDIA -

The successful bidder shall supply two copies of media of AMI applications and its related software's solution against the specifications.

18. DOCUMENTATION SCOPE –

The following documents (one set each) will be required for smooth functioning of the system. The successful vendor will provide ongoing product information for referential purposes and facilitating self-education by JKPDD/RECPDCL personnel. Key aspects shall include:

What documentation is included in the standard license fee, for example:

- User Manuals
- System Administrator Manuals
- Technical Manuals
- Installation Guides
- Business Process Guides
- Program Flow Descriptions
- Sample Reports
- Screen Formats
- Toolkit Guides
- Troubleshooting Guides
- Frequently Asked Question (FAQ) Guides

The clarity, comprehensiveness and accuracy of the documentation (an example document should be made available):

- The media upon which documentation is made available.
- The frequency of documentation updates and distribution mechanism of the updates.
- The ability for documentation to be customized for or by RECPDCL/JKPDD

Hard copy and soft copy of user manuals are expected to be provided by the successful vendor. These should include information on the application concepts in addition to transaction and field level documentation. Additionally, the Technical Users Information manual provides information on the BPA software's table structures.

Selected Bidder will be expected to assist in developing operational procedure manuals. If the user manuals are provided in Word format, the client should have the ability to customize their own manual to include specific business processes or operational procedures.

Selected Bidder can also be required to provide context sensitive on-line help, which includes all materials provided in the hard copy manuals. Where possible, users should be able to add their own on-line help documentation.

C. POST IMPLEMENTATION SUPPORT & WARRANTY REQUIREMENTS

The bidder shall be responsible for providing the support after go live of the system for 60 months "Warranty support" of project area including "Post implementation support". months. The scope shall include the following but not limited to the following

- a. Warranty of Hardware/software/Communication infra which include bug fixing, patches, replace, upgrade etc. and same shall be provided.
- b. Trouble shooting of AMI Hardware/Software.
- c. Maintenance of system and application response time.
- d. System and database administration
- e. Existing Application maintenance, correction, enhancement, new development, bug fixing etc.
- f. Maintenance, modification, enhancement and new integrated business processes.
- g. Post implementation support and management shall be governed by performance parameters as mentioned in this NIT.
- h. Post implementation shall also cover the new requirement of tools, application, reports etc. of utility.
- i. The bidder shall provide the off-site support of experts also to resolve the issues in shortest time.

NOTE:

Bidder shall be responsible to provide Warranty of all IT hardware (Storage, Compute, Network, Security etc.) for 60 months with 24x7 (Support) meeting the said Parameters i.e.

- Response time - 4 hrs. & Resolution time- 8 hrs.
- Recovery Time Objective (RTO) – 1Hr. & Recovery Point Objective (RPO) – 30minutes