3. TECHNICAL SPECIFICATIONS OF CCMS PANEL:

S. No	Features	Description
1	Operational Features	The CCMS should be capable of switching ON and OFF the lights of a particular switching point and/or networked switching point from Central Control Station instantaneously or automatically throughout the year on basis of sunrise and sunset time depending on the geographical location of the switching point. • The CCMS should be able to communicate to Smart Energy meters on GSM (with IMEI number) and/or RF proven technology based remote streetlight monitoring system The CCMS unit should have a battery backup of at least 12 hours. The CCMS shall have optically isolated communication port to fetch data (this is required for safe data transfer and to protect unauthorized access)
		The control panel at each of the switch point/ feeder should have necessary control elements along with single/ 3-Phase Non- CT/ CT operated (for higher loads) smart energy meter Complied to the specification of IS 16444 Part-I and Part-2 (CT operated) with the following features: Smart meters should be variant-2 as mentioned in IS 16444 with C1 and C3 connectivity and IHD (in house display) and IHD communication module, WAN Communication module supported with GSM and be able for reading, switching, data logging, communication and control as per remote instructions from Central Control and Monitoring Centre. Following Parameters read at Variable time-intervals: • Phase wise Voltages (Phase to neutral) • Phase wise Current • Phase wise Power Factor • Frequency • Total Active Power (kW) • Total Apparent Power (kVA) • Metering kWh cumulative • Metering kVAh cumulative • Time of the day (TOD) • Number of hours the power supply was unavailable.

S. No	Features	Description
		• Special emergency on/ off facility with wireless control.
2	Energy measurement and communication features	Smart energy meters should be capable of logging parameters for each 15 minutes time block with stamping of date and time. Such data logs should be retained in the energy meters for a period of 60 days or more. These data logs shall be communicated to CCMS. Benchmarking capacity so as to generate alert SMS for: • Phase-wise currents on crossing threshold values* • Phase-wise voltages on crossing threshold values* • Outgoing and incoming MCB trips • Theft alerts • Group failure of lights • Leakage to ground • No output supply • Alert SMS shall be forwarded to five (5) phone numbers Type testing and acceptance testing report as per IS16444 shall be done from BIS/NABL Accredited Lab to be provided. It is to be calibrated annually. Calibration and sealing of the meter shall be as per applicable supply code and regulations * Please refer the technical specifications for designing the threshold values for voltage and current.
3	Web based Application	Central Control and Monitoring System functionalities • CCMS shall have a web-server to receive and record all data with time stamping from the smart energy meters. • It should be able to communicate with any individual switching points or collectively amongst networked switching points for control and monitoring. • It should able to record LED Luminaires glowing and non-glowing hours of a particular switching point. • It should be able to display the power failure details of a particular switching point and the relevant luminaires. • It should register all fault conditions like excess voltage/current drawn, no-power supply, etc. through the instantaneous alert messages sent by the Smart energy meters. • Reports such as energy saving report, lamp failure report, actual hours of operation, uptime (%), etc. should be generated on a daily basis from the data/readings received from the Smart energy meters. • Different user authorization levels should be settable and the central server should be capable of handling heavy traffic, i.e. the number of LED streetlights installed in wards under this program. • GIS Mapping should be done covering all switching points and the details of each switch point shall be viewable in the web application software through a Google-map interface or web based digital map.

S. No	Features	Description
		• All the CCMS units should be remotely configured from the Central • Control Unit: o Setting new ON/OFF timings o Setting the Response Time Count (RTC) time of Automation unit o Knowing the current status of any particular switching point. o Reset the unit. o The minimum interval for the update of data should be 15 minute but programmable up to 1 minute. o Auto synchronization of controller with server timing to be further synchronized with standard GPS clock timing. • The system monitors all the following from the Smart energy meters: o Voltages each phase o Current each phase o PF each phase o Metering kWh cumulative o Metering kVAh • Further system is able to indicate various faults o Failure of contactor o Status of the incoming supply (power failure) o High /low voltage o Overload on the phases o Number of hours of a group of LED luminaires connected with each switching point was glowing. • The central CCMS unit is capable of handling minimum 2500 number switching point units. • CCMS shall have server preferably dedicated server set-up or cloud-based arrangement to ensure 100% guarantee of the data transmission and real time data storage for last 2 years (24 Months) and archived data for the contract period. • Data authenticity and validation has to be ensured. Reports to be submitted in a common CS Smart energy meters format • Cyber security, safe database management, data retrieval and trouble-free operation of software and allied systems (24*7) to be ensured. • CCMS system should have a self-healing mechanism and in case of failure, Bidder to ensure resumption of service within 24 hours. Till resumption of full services, the default settings of the CCMS should ensure timely ON/ OFF operation of the streetlights. • System to report jamming/ hacking attempts and maintain status-quo in case of jamming/ hacking attempts i.e. if lights are ON, they should remain ON till the default OFF time recorded in the system. In case lights are OFF at the time of jamming attempt/ hacking, lights should remain OFF till default ON time recorded in the system.

S. No	Features	Description
		MOBILE APPLICATION: • **Platform**: Android • **Remote operation**: Switch ON / OFF (scheduled and on-demand). • **Report:** Consumption Reports (Current & Historical).
4.	Outer Box	OUTER BOX AND INTERNAL WIRING: Enclosure Material: MS sheet SWG 16 / 14 duly powder coated for corrosion resistance and long life. Earthing to be provided to the box. Visual: Opaque Ingress Resistance: IP-55 Impact Protection: greater than IK08. Fire retardant: Yes Door Tamper Switch: Push notification Locking Arrangement: Standard Lock
5.	**Smart meters**	**As per IS 16444 and shall comply specifications approved by respective BESCOM**

4. Technical specifications for Smart Energy Meters

i. The technical specification for the smart energy meters shall be certified by concerned BESCOM as per Karnataka Electricity Regulatory Commission (KERC), Central Electricity Authority and BESCOMs compliance.

ii. Concessionaire may procure the meter either from the vendors certified from BESCOM conforming to CEA/BESCOM technical specification.

5. Technical Specifications for Switching points / Feeder Panels

5.1 Broad Operational Features

a. Switching points/ Feeder panels should have GSM based remote streetlight monitoring system with capacity for self-protection from short-circuit, over voltage and anti-theft alert.

b. Principle equipment should be designed on the basis of 'Lossless Series Reactance with Secondary Compensation" technology ensuring efficiency of such principle equipment should not be less than 99.4% between 50% - 110% of loading.

c. Other than basic switching components, no other moving parts are allowed to be installed in the feeder panel.

d. Provisions to be made to protect the technologies and all components of feeder panels even if quality of

power supply at the feeder level is not as per standard of performance and supply code regulations of utility.

e. All the principle equipment's along with input output switchgears, metering, switches (by-pass and tap changers), contactors, fuses, auto transformer coils etc. should be of reputed manufacturers like Siemens/ ABB/Schneider/GE/TAS etc. and should meet best engineering practices and norms as applicable in IS 8623 for LV switchgear and control assemblies, IEC: 60947-1&4 / IS:13947-1&4, IS 8828: 1996 / IEC 60898-2002, IEC 60947-3 standards and other relevant standards.

5.2 Rating and Switching components

a. The rating of the feeder panel switchgear should be at least 1.3 times the lighting load as estimated for new LED fixtures during the initial studies prior to replacement.

b. Electrical Contactor used in feeder panel should be compliant to IEC: 60947- 1&4 / IS:13947-1&4, Miniature Circuit Breaker (MCB) Specification should be compliant to IS 8828: 1996 / IEC 60898- 2002 & specifications for 3 position Load Break Switch (Rotary type) to be used in Manual and Auto mode should be compliant to IEC 60947-3 standards.

c. Feeder panels should be provided with appropriate rating of harmonic filters to keep the % ITHD at levels below as specified by Utility. Switched fuse units should be of 32 Amp continuous AC current capacities. Fuses used should be of 20 Amp. Rating of high rupturing capacity (S/ c current at least 50 kA)

d. 240 V AC 50 Hz Single Phase Two Wire / 415 VAC 50 Hz Three Phase Four Wire Input.

e. Power factor shall be more than 0.95

f. The panels should be equipped with a microprocessor based Dual Channel Almanac Timer controller (Astronomical timer-based controller) which should be user programmable to enable setting of ON/OFF times and also switching over to savings mode/bypass mode when required.

g. In case of Single-phase controller units, one (1) contactor for switching on/ off and in case of three- phase controller units, one (1) contactor for each phase is to be provided. The number of contactors used should be suitable for ON/OFF and for changeover between full voltage to various voltage taps and interchanging between taps in line with specifications of current controller.

h. Deleted

i. Deleted

Communication Provisions

a. GSM modem for communication should be a Dual-band modem with power consumption less than 3 watts & modem should be programmed to be in Sleep-mode whenever communication is not done.

Enclosure & Fabrication

a. Enclosure Box of feeder panels shall be IP-55 compliant and should be fabricated out of MS sheet SWG 16 /

14 duly powder coated for corrosion resistance and long life. Panels should be provided with Hooter for door open. Utility Service Lamp inside Panel for use during maintenance work Gland Plates for Cable Entry at Incomer and Outgoing

b. Design life of the control panel should be mentioned in form of MTBF (mean time between failures) and it should be minimum 10 years.

c. Deleted

d. Deleted

6. Specifications for Centralized Control and Monitoring System (CCMS) & Automation System

Objective of centralized street light automation solution is to provide centralized control & monitoring of streetlights from a single control center and is capable of controlling, monitoring and analyzing the details at streetlight feeder panel level (switching point level). This will facilitate optimizing the energy costs by timely switching on/off of lamps & implementing voltage regulation during off-peak hours as well as savings in present street light maintenance cost by setting new standards in managing streetlights with minimal expenditure.

Centralized Control and Monitoring System (CCMS) & Automation System is comprised of wireless Central automation controller, server cluster, control center, enterprise middleware system, enterprise Management Information System and call center. The broad specifications for various components of CCMS and Automation system are as below.

7. Broad Operational Features

a. CCMS shall have a web-server to receive all data from the streetlight controllers

b. GIS Mapping should be done covering all switching points and the details of each switch point shall be viewable in the web application software through a Google Map interface or web based digital map.

c. Bulk messaging facility to be given so that any common changes to be effected into the individual street light controller equipment's. CCMS panel is streetlights controller suitable for group control of lights.

d. CCMS should have real time control and should register all fault conditions through the instantaneous alert messages sent by the street light controller equipment's

e. Inbuilt scalability to support large lighting network.

f. The concerned personnel at the Authority should have access to the data (viewing rights) on a real time basis as well as the reports.

g. User settable Individual feeder panel ID & Password protected access to control functions.

h. Control Center to provide a snapshot of lighting status for a ward, zone, entire city.

8. Wireless Central Automation Controller

a. Act as heart of automation and should facilitate remote and auto on/off of streetlights for streetlight connected on different feeder panels.

b. Reports various parameters to server clusters. These are parameters that are captured by metering system and streetlight controller at individual feeder panels.

c. Report faults at individual feeder panels such as fuse failure, power failure, MCB trips, over load, contactor fault, activation of manual switch, ground fault, control cabinet door open, indication for street light failures, feeder panel door open etc.

9. Data storage and processing

Use high end server system/ cloud service which allows unlimited redundant data storage using any quality database systems.

The data collection system should work on open protocol having mechanism for assured delivery of data sent by hardware device

Data Backup: The System should have automated back-up facility to have regular back up of the data to ensure availability of the data and information. This should be achieved through mirror imaging of two HDDs. The backup system should facilitate any data regarding performance of the system in the last 24 months in 1 working day and any data regarding performance of the system during any period of the concession within 5 working days.

The centralized server should be adequately backed up for at least two hours by installing and maintaining suitable capacity online UPS system and air condition system for operational reliability.

10. Deleted

11. Functions

Complete monitoring on image of the entire geographic area at the screen and with projector attachment – on back wall, where the operators monitor the streetlight and dispatch maintenance teams. Any alarms and their exact location should be shown on the map for easy and fast overview.

12. Enterprise Middleware

The application software should be based on service-oriented architecture and platform independent.

13. Enterprise Management Information System

Complete end to end enterprise software system to facilitate control, monitor and minimum key modules of management information system should be maintenance, planning, inventory management,

contractor/maintenance, staff performance monitoring, reporting and access Control.

14. Deleted

15. Reports Generation

Reports such as energy saving report, feeder panel failure report, % uptime, etc. should be generated on a daily basis from the readings received

Asset management software showing defective units, if any and other user-defined asset management software showing defective units, if any and other user-defined reports should also be available in the CCMS.

16. Inspection:

a. The Bidder will keep the Authority informed in advance of the time of the starting and the progress of manufacture of equipment in its various stages so that arrangement could be made for inspection if necessary. The representative of the Authority will have access to the supplier's or his sub bidder's work at any time during working hours for the purpose of inspection.

b. The Concessionaire shall conduct testing and produce relevant reports of LED Luminaires, CCMS and smart meters by drawing samples from their manufacturing units to the authority. Sampling should

- For LED: 1 in every 100 units.
- For CCMS and Smart meters: 1 in every 25 units.

c. Inspecting the materials during manufacturing of the materials / equipment and testing and may select test samples from the materials going into plant and equipment. The supplier will provide the facilities for testing such samples at any time including access to drawings and production data at no charge to Authority.

d. Intimation to Authority by email and carry out the tests in the presence of representative of the Authority. If Authority feels necessary, it may select one sample from the lot at factory to send for testing at CPRI/ERTL/MNRE or any other standard NABL accredited laboratory.

e. The Authority may at its option get the materials inspected by the third party if it feels necessary.

f. The dispatches will be affected only if the test results comply with the specification. The dispatches will be made only after the satisfaction by the Authority's Engineer in charge of the Project.

g. The acceptance of any quantity of materials will in no way relieve the supplier of its responsibility for meeting all the requirements of this specification and will not prevent subsequent rejection if such materials are later found to be defective or deviation from specification/IS.

h. The supplier will give 7 days' advance intimation to enable the Authority to depute its representative for witnessing the acceptance tests, if necessary.

i. If any inspected or tested materials / equipment fail to conform to the specification, the Authority may reject the materials and supplier will either replace the rejected materials or make alterations necessary to meet specifications requirements free of costs to the Authority.

j. After the delivery of material, it may be verified/ retested in full or taking one random sample before acceptance. In case of any deviation to the specification, found during the tests, the lot will be rejected or will be replaced by Bidder without any additional cost to Authority.