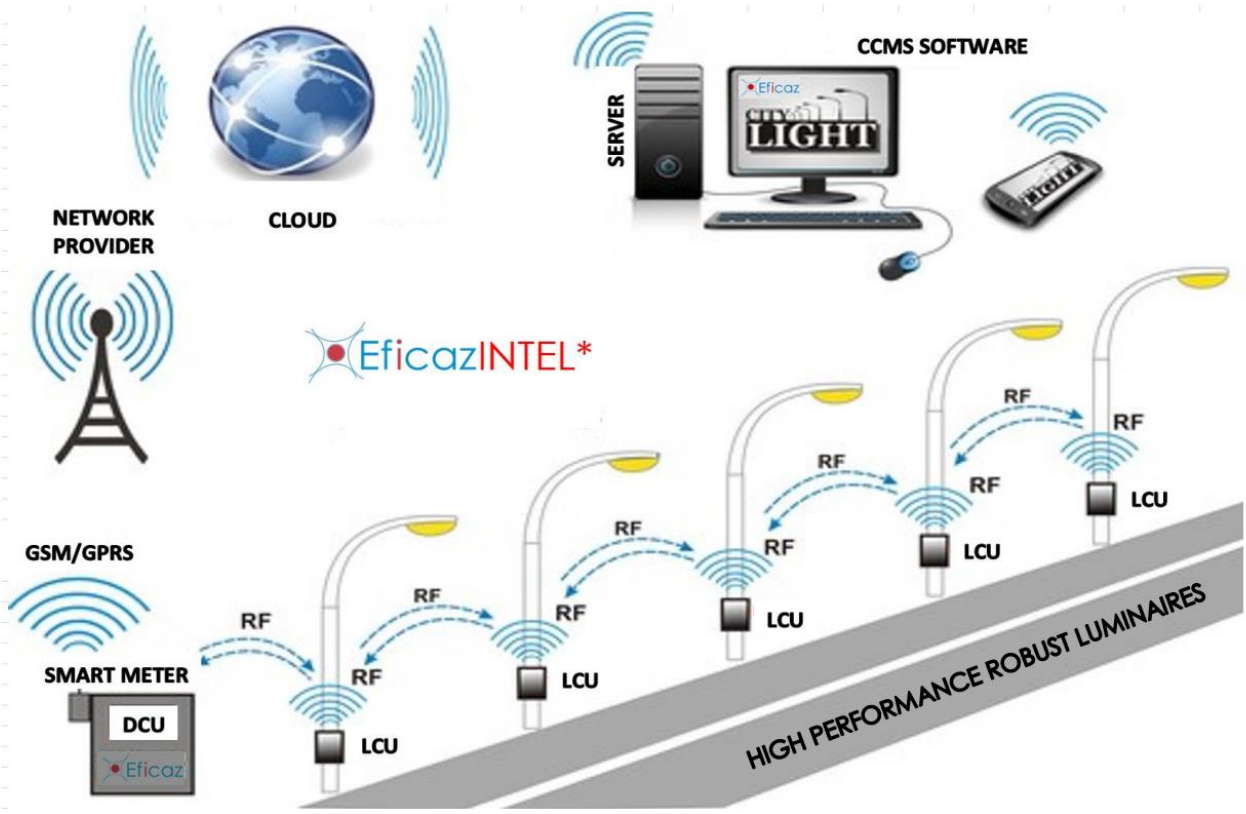
EficazINTEL™

SMART TECHNOLOGY

Solution Architecture



Street Light Automation System

Smart System Technical Information

This document serves the purpose of requirement for street lighting automation for Smart City development on the **EFICAZINTEL** platform. It mentions the components and technicalities of the solution.

EFICAZINTEL is our state of the art, indigenous wireless streetlight automation solution.

Solution Components:

Sr. No.	Items	Remarks
1	**Lighting Control Unit (LCU)**	**LCU is a standalone street lighting controller device that shall be installed on every street light for On-Off-Dim-Fault detection purpose.** • It shall have inbuilt wireless radio based on sub 1 GHz LPRF technology. • The SLC enabled streetlights form a mesh network and support two-way communication with the cloud based lighting management server software. • It shall have inbuilt support for o Relay (5A): 1 or 2 Qty. (For ON / OFF of streetlights of up to 400 W o Analog output (0-10V): 1 or 2 (For dimming support with external light dimmer / driver) o Fault detection • **RF specifications:** o Frequency of operation: ISM band 865-867 MHz o Transmit power: 15 dBm o RF standard: IEE 802.15.4 o Range: 600 meters+ (LOS) and 80 meters+ with one concrete obstacle. • Power supply: 230V AC • Enclosure: Bought out enclosure

		• Device software: SmarttMesh – mesh networking software o Self-forming, self-healing network o Up to 25 hops o Facility to configure PAN o 128 bit AES encryption • Shall support ***over the air remote firmware and configuration upgrade*** of all the SLC devices from the lighting management server software. • ***Note:*** *Dimming can be supported only if the LED driver is dimmable.*
2	**Smart meter (At feeder box)**	**This is a three phase smart meter a standalone metering unit that shall be installed at existing feeder box for the street light energy consumption measurement.** • It shall be class 1 panel type energy meter with external CT as per installation requirement and have interface with wireless radio based on sub 1 GHz LPRF technology. • The Smart meter shall be a part of a mesh network and support two-way communication with the cloud based lighting management server software. • It shall measure electrical parameters like voltage current per phase, kWh, power factor for further load analysis. • **RF specifications:** o Frequency of operation: ISM band 865-867 MHz o Transmit power: 16 dBm o RF standard: IEE 802.15.4 o Range: 600 meters+ (LOS) and 80 meters+ with one concrete obstacle. • Power supply: 230V AC • Meter communication port: RS485 / Modbus • Enclosure: Bought out enclosure • Device software: SmarttMesh – mesh networking software o Self-forming, self-healing network o Up to 25 hops o Facility to configure PAN o 128 bit AES encryption

3	**Data concentrator unit (DCU)**	**Standalone device with** front end of Sub 1 Ghz LPRF radio and backend of GPRS. • Internal storage: SD card, 2GB • Communication interface: GSM / GPRS / Ethernet • Radio: Sub 1 GHz LPRF radio • Inbuilt RTC • **RF specifications:** o Frequency of operation: ISM band 865-867 MHz o Transmit power: minimum 16 dBm o RF standard: IEE 802.15.4 o Range: 600 meters+ (LOS) and 80 meters+ with one concrete obstacle. • Power supply: 230 V AC • Enclosure: Bought out enclosure • Communication port: RS485 (optional) • One DCU can support up to 200 wireless nodes (SLC nodes + 10 smart meter nodes) • Shall support over the air remote firmware and configuration upgrade of all the SLC devices. • **Mesh networking device software: SmarttMesh** o Self-forming, self-healing network o Up to 25 hops o Facility to configure PAN o 128 bit AES encryption • The DCU device should support collection and reporting of the metering data at every 15 minutes' interval. • Internal storage: SD card, 8 GB for offline storage of data. • The DCU unit should support a battery back of at least 4 hours. • The DCU enclosure should be such that it can be mounted on a pole / feeder. • The enclosure should be of metal / ABS with IP55 / IP66 and should have lock-n-key arrangement. • The DCU shall send the data to the lighting management server software over reliable GPRS communication backbone / Ethernet based backbone and efficient communication protocol.

		• The DCU should be able to store the schedule locally for switching ON and OFF the lights connected to it as per schedule configured. It should also support real time ON / OFF of luminaire. • The DCU should support over the air remote firmware and configuration upgrade mechanism. • One DCU should be able to support minimum 200 wireless luminaire and up to 5 metering units.
4	**Lighting management server software (Web based SCADA)**	**The lighting management server software shall be a software that can be installed on a cloud server like Amazon or a standalone server grade machine at client side.** • The lighting management server software shall be software that shall be installed on the server of the ULB / Municipal Corporation. • The lighting management server software shall be made such that it can support more than 100,000 wireless street lights. • The server software should have an intuitive user interface, easy to use and navigate. • It should support search and filters for ease of usage and navigation to identify lights that are – healthy, faulty. • It should support a dashboard which can give a quick view of an area / feeder / luminaire. It should typically support o Electrical parameters of the feeder / metering unit – three phase voltage, current, KWH. o Status of lights downside the feeder / metering unit alerts / notification icons. o Button to do an "On demand" ON / OFF / DIM of group of lights below the feeder / metering unit. o The lighting management software should support alerts for – faulty lights, over voltage, under voltage, over current, power outage. • It shall support the facility to do grouping of lights, metering units. The naming should support alphanumeric string.

		• The server software should support configurability for thresholds for over voltage, over current, under voltage, wattage of lights connected. • The server software should be able to configure the ON / OFF / DIM schedule for a switch point or group of switch points based on Sun rise / Sunset and shall also support configurability of the time as desired. • It should have a mechanism to detect faulty lights downside a feeder / metering unit. • The software shall support configuration of five mobile numbers and five email addresses per feeder point for SMS and email notification of alerts / alarms. In case of faulty light, the SMS sent should also send the GPS coordinates and id of the light. • It should support user role creation with different access permissions for User / Supervisor / Manager / administrator • The device configuration shall support configuration of the APN and network service provider details. • The lighting management server software should support summary screen to get a tabular and or graphical overview of the complete installation status with percentage / count of healthy / faulty in a given area, under a feeder and also of the complete city. • The lighting management software should be able to identify the exact location of the light on which the fault has occurred with relevant GPS co-ordinates. • The lighting management server software should have integration with google or relevant maps to show the location of luminaire and metering units on the map. • The server software should support following reports: o Operational hours report for an individual light / group of lights under a feeder / metering unit. o Fault report with light id, location and duration from which the fault is active. o Alert / alarm report with date & time stamp for fault, power failure, under voltage, over voltage, over current. o Energy consumption report with KWH, current of all phases, voltage of all phases, active power, reactive power.

		o User activity report to detect who had logged in at what time and what action was done on the server). o Energy saving report. This shall be based in comparison with the earlier wattage / consumption as finalized by IMVP protocol. o Fault penalty report as per the agreed SLA. • The user interface of the software should support accessing of reports for daily, weekly, monthly or custom date selection. • The resolution of the lighting management server software shall be such that it can be accessed from a computer / laptop / mobile / tablet. • The lighting management server software should support export of the report data in a CSV format such that it can be accessed in Microsoft Excel for further analytics. • The server software should be able to report the alert / alarm notification via SMS and email to pre-configured mobile numbers and email address. • It should have required antivirus, malware and protection against hacking attacks.
5	**Mobile interface**	• The solution shall support interface and user touch point over a normal android phone with relevant application. • The purpose would be to support on demand operation of luminaire in a given area – ON / OFF / DIM of luminaire without need for GPRS connection. • The mobile app should support the functionality to synchronize with the lighting management server software over GPRS connectivity.
6	**Range extenders / repeaters** (optional as required on site)	• Depending on the site scenarios, it is possible that in certain areas we would require repeaters to ensure better radio coverage. • The range extender shall be 230V AC operated devices. The radio specifications shall remain the same as SLC.

7	**Training and onsite support**	• EFICAZ shall train your crew for onsite installation, commissioning basic debugging of the solution components including SLC, DCU, lighting management server software. • We would recommend at least 6 week of training to your team (crew). • Extended support shall be per day per person basis.