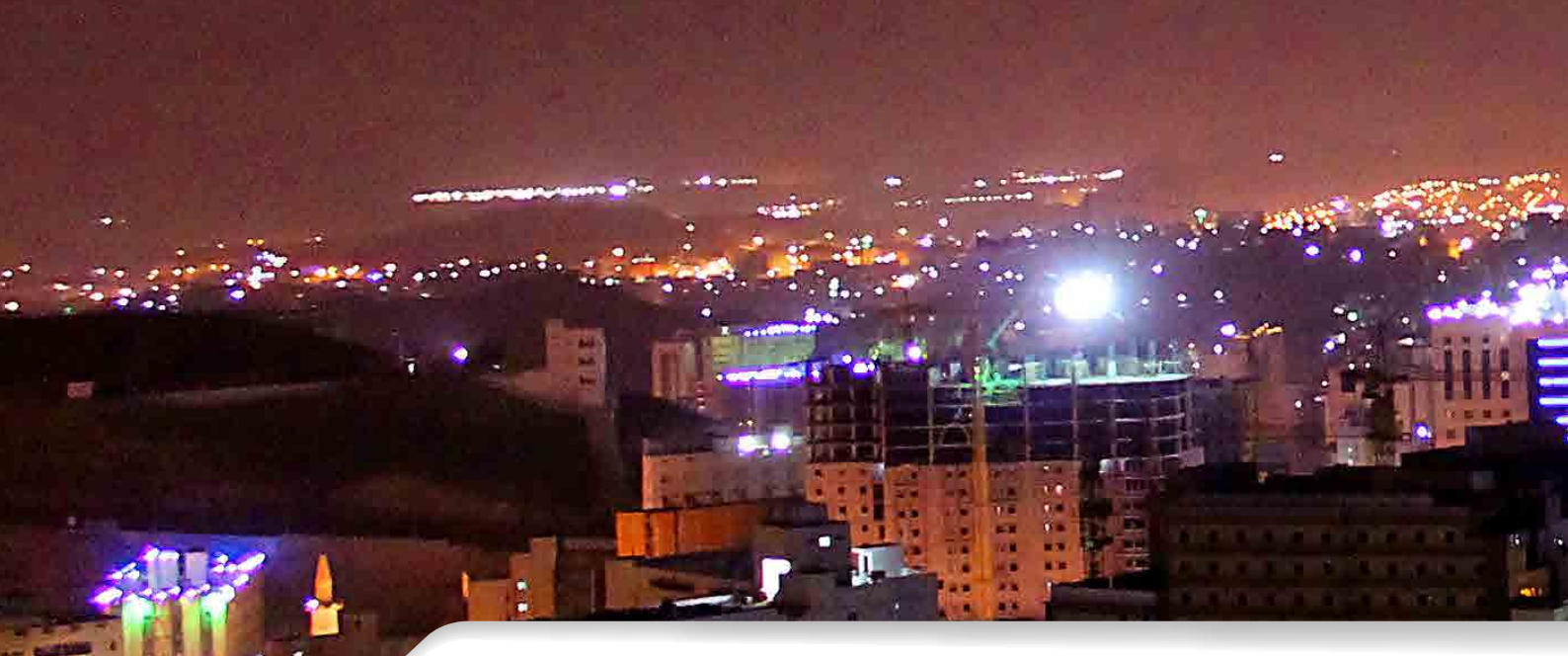
CASE STUDY

Smart lighting solution in Makkah

Location : Makkah, Kingdom of Saoudi Arabia
Project : PLC LonWorks for Street Lighting Remote control and management solution: ***LumnexLightControl™***

Lumnex



LumnexLightControl™ allows the electricity consumption reduction by at least 25%

CLIENT AND LOCATION
Municipality of Makkah,
Kingdom of Saoudi Arabia

CONSULTING ENGINEER
Ibrahim Hafiz

CONTRACTOR
TOPSCREENS

LIGHTING SOLUTION
LumnexLightControl asset and remote lighting management system connected with more than 8000 Ferromagnetic luminaires. Upon the completion of the project in 2016, we expect to extend the installation to a total of around 100,000 connectable luminaires.

PROJECT REALIZATION
2015 - 2017

BACKGROUND

In 2013, the municipality of Makkah was launching PoC for validating street light management solutions in order to put in place a remote control system for better maintenance.
Topscrees and Lumnex joined together for offering a complete sophisticated a real time management system for Makkah street lights. Makkah municipality had already tested two solutions from big names in lighting but was not satisfied. Engineer Ibrahim Hafiz, Consultant for street lighting of Makkah municipality explainss: “Our big concern and maintenance is the infrastructure real time control rather than energy saving. My customer wants to receive alarms within 15mn when failure happens. We want also to protect the control cabinat as we are facing steal of equipments and electricity tampering. We quickly realized that having an overview and control are just as important with regard to the overall operating costs, traffic safety and the safety of our residents.”

THE CHALLENGE

We wanted a solution which, over time, would benefit all residents and visitors of Makkah Holly City in the municipality. Our city can have more than 4 Million Visitors for Haj season and more than 1 Million Visitors during remaining seasons of the year (Omra). Street Light is more than LIGHT topic for municipality, it’s safety and reputation issue for the Kingdom: Maintenance of more than 150,000 luminaries should be as easy as single luminary maintenance. The environmental operations are so critical (Very High Temperature) that the municipality wants to keep Ferromagnetic Ballast technology.
The smart solution shall adapt to the environment and Ballast technology that the municipality wants to keep in place.

SCOPE

Makkah City was very concerned about the efficient use of its citizen's satisfaction and about security. In 2015, the city had two main challenges:

- Reduce energy consumption to contain electricity costs while attaining a 20% reduction of CO^2 emissions.
- Reduce the number of cabinet failures, lamp failures and lamp down time to avoid potential security issues for drivers and inhabitants.

LUMNEX NODE (LCU)

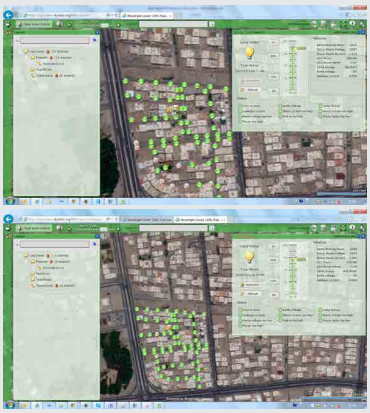
Lumnex had developed specifically a node (LCU as Light Control Unit) made to control Ferromagnetic Ballast with three steps of power: AXESS-PL-1F, this device covers two versions: 250W & 400W ballast control (see opposite).

LUMNEXLIGHTCONTROL™

LumnexLightControl™ solution identifies and displays all the failures from the lamp, the capacitor, the ballast, the pole, and the streetlight segment controller right on the desk of the maintenance department or maintenance contractor. It automatically collects, aggregates, analyzes, lists and sorts streetlight failures and enables to handle alarms to be remotely warned.

City of Makkah and its maintenance companies can now reassign maintenance crews at night to added-value tasks and remotely handle any technical problem and operation, thus reducing costs of onsite operations.

LumnexLightControl™ is an open centralized and online Streetlight Management and Monitoring software Platform.
End-user interface for streetlight maintenance operators.
The Lumnex Light Control Web Portal provides with many web business applications to authorized end-users, of which streetlight failure identification and troubleshooting, energy efficiency analysis, lamp preventive maintenance, remote control for special operations, lamp dimming configuration, business indicator and geomap data display.

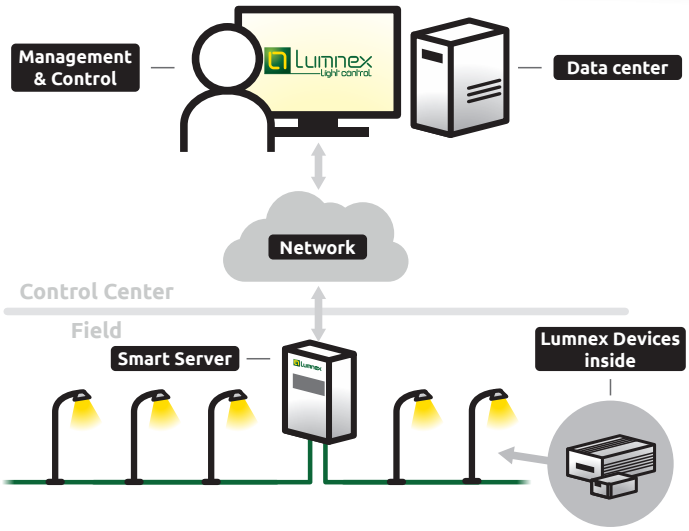


CABINET CONTROL

110 control cabinets are equipped by a Ilon Smart Server from Echelon with specific web pages application built-in to manage Makkah project especially. The installation included several inputs in regards to control each breaker in the cabinet. In the same time, there was a specific prior input for control of "Main Breaker" at IN/OUT.
To secure the alarm transmission in case of "Main Breaker" failure, we offered a UPS for backup of more than 30mn in order to allow the Ilon Smart server sending "Emergency Alarm" for immediate maintenance.

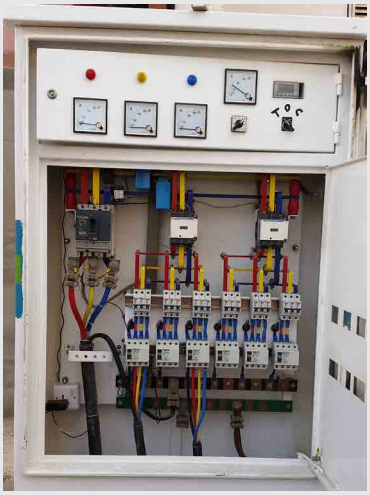
AXESS-PL-1F 250 & 400

The LCU developed by Lumnex for this specific project allows the control and dim at the luminarire. We offer 3 steps of Power: 100%, 85% & 70%.
The LCU has complete metrology feature with class 1.0 accuracy. It can measure and communicate the following parameters: Energy (kWh), Average Power (W), RMS Volltage (Vrms) and Current (Irms) and Power Factor. It processes also the working hours in order to prevent against aging of the ballast and the lamp.
The LCU can detect and send alarms for the following failures: Leakage current, Leakage Voltage and pole inclination
Two devices are offered: One for ballast 250W and one for ballast 400W.



THE SOLUTION INVOLVES THE FOLLOWING:

- Each luminary is equipped with 250W or 400W Ferromagnetic ballasts. The pole is equipped with Axess-PL-1F node.
- Each supply cabinet is equipped with a certified streetlight segment controller that enables bidirectional communication over 4G with the central Lumnex Light Control streetlight monitoring software. It automatically switches on and off the mains using its internal astronomical clock and dims the ballasts during the night to save electricity when less light is needed on the ground.
- The Segment controller is connected through RS232 to :
  a. an additional 16 inputs module to monitor the states of contactors, main breakers and feeders of the cabinet
  b. a smart meter to measure the electrical parameters of the main supply
- Local telecom provider is providing a secure communication connection over their 4G network.
- The Lumnex Light Control M2M Data Collect software collects, aggregates, transforms and stores data coming from all streetlight segment controllers in a central, open database which is installed at the city centre.
- The Lumnex Light Control Web Portal provides intuitive end-user Web reports designed for maintenance operators (failure detection and troubleshooting, dimming configuration, installation assistance) as well as for managers (service quality indicators, energy consumption analysis).



LÉGENDE PHOTO

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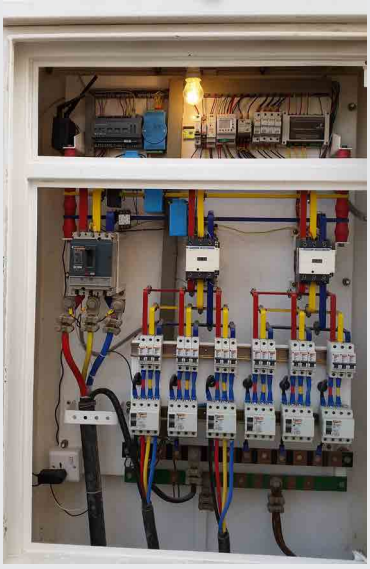

LÉGENDE PHOTO

Engineer Ibrahim Hafiz,
Consultant of Municipality of Makkah

« We are approaching 99% efficiency of working lamps.

Finally, we have been offered a real system with a real and efficient management of our street lighting assets. Today, we feel getting, under full control, our street lights thanks to LumnexLightControl™ whereas we can:

- dim or increase the lighting level in each individual luminary at any time, ensuring the best possible safety for traffic and citizens,
- detect in real time various failures such as lamp-off, pole inclination, pole door opening, earth leakage current, earth leakage voltage, over and under line voltage...
- get in real time various alarms through emails and sms for immediate maintenance processing
- control cabinet failures such as main voltage off or cabinet door open... generate and communicate remotely alarms for any type of failure at luminary.

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Lumnex

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