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India SMART UTILITY Week 2024

Supporting Ministries



Session : EVOLVING TRENDS IN ELECTRIC MOBILITY

Inter-City Operations of Electric Buses/Trucks, Vehicle to Grid (V2G), Electric Highways

Presented By

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- **Electric Highway:** An electric highway is an innovative concept that aims to revolutionize transportation by integrating electricity into road infrastructure.
 - Overhead Powerlines
 - Ultrafast Charging
 - Wireless charging
- **Portable Charging Stations:** An innovative concept of making charging stations on the wheel for remote areas

- An electric highway is an electrically-augmented road.
 - It generally refers to a road that provides electricity to moving vehicles
- Purpose & Benefits
 - **Promoting Electric Vehicles (EVs):** Electric highways encourage the adoption of electric vehicles by providing a reliable and efficient charging infrastructure.
 - **Reducing Emissions:** By powering vehicles with electricity, we can significantly reduce greenhouse gas emissions.
 - **Energy Efficiency:** Electric highways enable continuous charging while vehicles are in motion, making them an energy-efficient option.
 - **Enabling Net Zero Transport Sector**

Electric Highways with Overhead Power Solutions



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- **Charging Infrastructure:** Establishing a robust network of charging stations along inter-city routes is crucial. Collaborations with state governments and private players can accelerate this process.
- **Continuous Charging:** Vehicles can receive power while in motion, eliminating the need for frequent stops at charging stations.
- **Urban Integration:** Electric highways can be integrated into existing road networks without significant visual impact.
- **Safety:** Risk of overhead wires falling or causing accidents.
- **Infrastructure Adaptation:** Upgrading existing bus depots and maintenance facilities to accommodate electric buses.
- **Policy Support:** Governments need to provide clear policies, incentives, and regulations to encourage adoption.
- **Holistic Platform :** A holistic platform is required for managing the charging infrastructure in Highways



Advantages:

- **Invisible Infrastructure:** Unlike overhead power lines, which are visible in nature.
- **Safety:** No risk of overhead wires falling or causing accidents.
- **Continuous Charging:** Vehicles can receive power while in motion, eliminating the need for frequent stops at charging stations.
- **Urban Integration:** Electric highways can be integrated into existing road networks without significant visual impact.



Electric cables hidden under the road generate a field which is then caught by a special coil in the car.

Challenges and Implementation:

- There is a 50:50 chance of success/failure in Piloting these R&D projects
- Both Govt/Corporates should be willing to take risk in experimenting such projects and studying the technical and commercial viability in Indian roads.

- The flash-charging technology allows for ultra-fast charging at intermediate stops optimising operational cost and availability for fleet operators. It will be like a touch-and-go solution wherein the bus will get charged in 20 seconds when the vehicle halts for passengers to enter and exit.
- Instead of the usual trolley poles connecting overhead lines, the e-bus has a controlled, moving arm that connects to an overhead receptacle integrated into the bus shelter in less than a second.



Ultra Fast Charging Station for BUS

Implementation:

A flash-charging station is installed at every fourth or fifth stop depending on the bus route. This technology eliminates the visual impact of the overhead lines associated with trolleys and reduces the noise emissions of diesel buses.

How do we provide EV charging facility in remote areas where keeping HT Lines are not commercially viable?

How do we respond to a situation where emergency charging is required in highways where there are no charging stations near-by?

The answer could be Portable Charging Stations.

Concept:

Portable charging station (PCS) is based on BESS container which can be placed in highways-where charging infrastructure is not available.



Concept Image of a Portable Charging Station

Challenges and Implementation:

- Custom Made Energy Trucks – Multiple EVs charging (Fast/Slow)
- Small BESS in Goods Career Auto Rickshaws (For Bike Charging, Emergency Response)
- **V2G Concepts** can be also used for charging the BESS on the Wheel (futuristic concept).
- Parking Space for the Trucks shall be facilitated by Transport Department
- Need to form an alliance with Truck Manufactures, BESS Manufactures, Battery Manufactures, EVSE OEMs, CPMS etc. in order to make cost effective solution.



- The inter-city bus transport market in India is estimated at over **\$15-20 billion**.
- Investments in highway expansion are driving growth at a **10% CAGR**.
- Electric buses can play a pivotal role in achieving national fuel security and reducing emissions.
- Source: inc42.com



- **Britain To Test Roads That Charge Electric Cars While They Drive**
- UK is taking a step forward with plans to trial wireless recharging lanes. This would mean that British roadways would be supplemented with specially marked lanes. The technology hidden under these roads would allow for wireless charging of electric cars that have the right equipment.
- **Over next five years, UK will invest £500 million to stay on the cutting edge of the technology.**

Source: [Britain To Test Roads That Charge Electric Cars While They Drive | DeMilked](#)



- The Electreon project in Sweden is set to connect the town of Visby on Gotland Island to a regional airport via a wirelessly charging electric roadway
- Sweden is building the world's first permanent electrified road for EVs to charge while driving - The first of its kind in the world, the e-motorway may lead to an expansion of a 3,000 km of electric roads in Sweden by 2035
 - Volvo is testing wireless EV charging tech in Sweden
- ABT e-Line plans for commercial introduction of wireless charging, starting with the Volkswagen ID.4 in 2024

VEHICLE TYPE:

E-bus with a supercapacitor battery and a heavy-duty e-truck with a lithium-ion battery

ROADWAY LENGTH:

1.65 km (1-mile) of public road

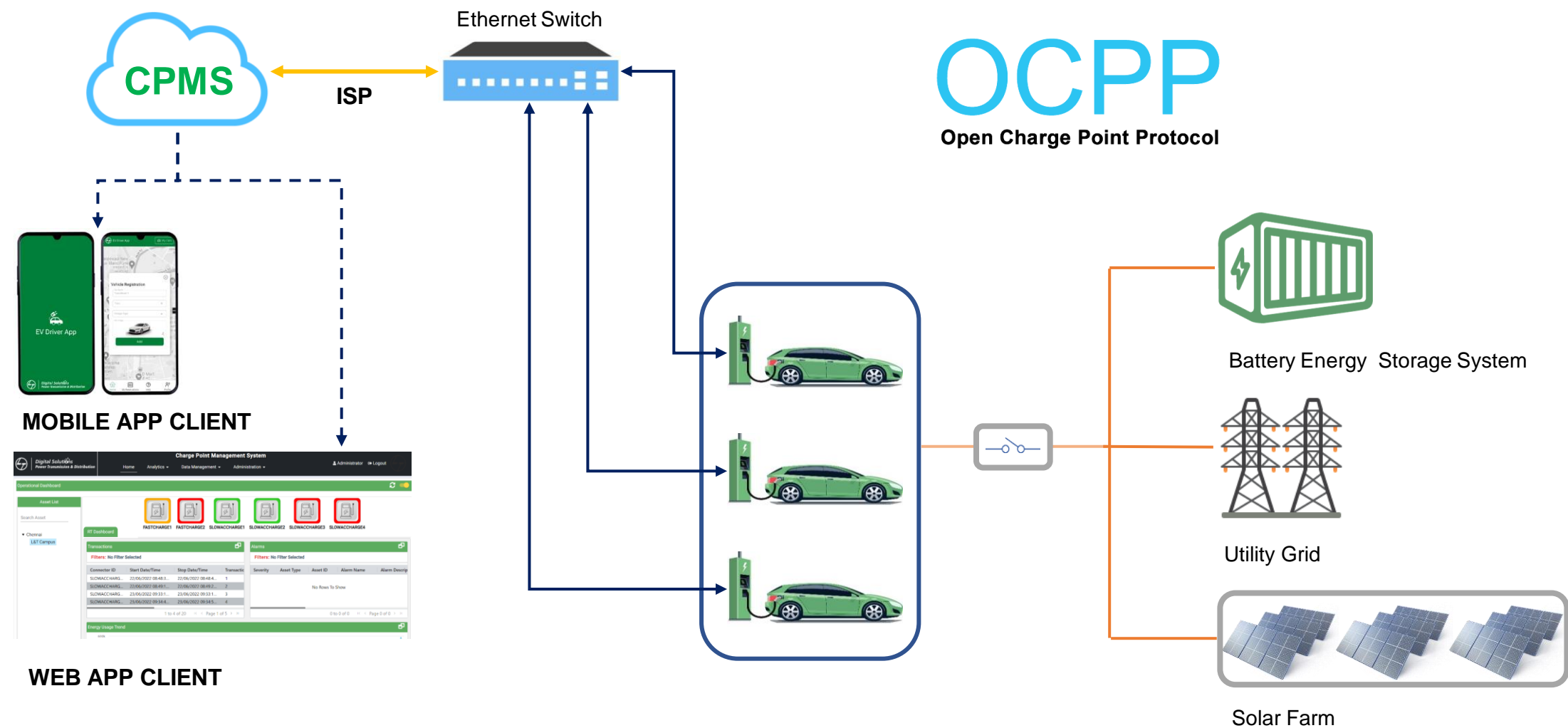
Source: [Electreon](#)



L&T Charge Point Management System

A grid interactive EV charging automation solution by L&T Digital Energy Solutions

CPMS – Application Architecture



Project Experience - L&T HQ Chennai Office



142kW Fast charger Box 1No's

Connector gun 1 - DC 60 kW CCS2

Connector gun 2 - DC 60 kW CCS2

Connector gun 3 - AC 22 kW Type 1

10kW Slow charger Box 2 No's

Connector guns 3 x AC 3.3kW



SHEMS – Product Overview

SHEMS web application allows operator user to monitor the EV charging across the site. Operator can visualize the real time status of the electric vehicle charging.



- ★ User Management
- ★ Realtime view of the system
- ★ Sites linked with GIS map
- ★ Measurement data with Analytics dashboard
- ★ Assets , types, vendors & grouping management
- ★ Modbus protocol



- Technologies around EV Charging Infrastructure are evolving
- Wireless Charging is safer and more sustainable solution
- Standardisation is required for different technology interoperability scenarios, communication interfaces, charging infrastructure etc.
- Need a Holistic Platform for bringing complete visibility of Charging Infrastructure Management, Fleet Management, Energy Management with AI/ML based recommendations for Load Management
- Govt, Utilities, Policy Makers, Regulators, Solution Providers and R&D Organizations have to work together for piloting some of the promising technologies and perform a detailed study before finalizing the solution.

THANK YOU

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