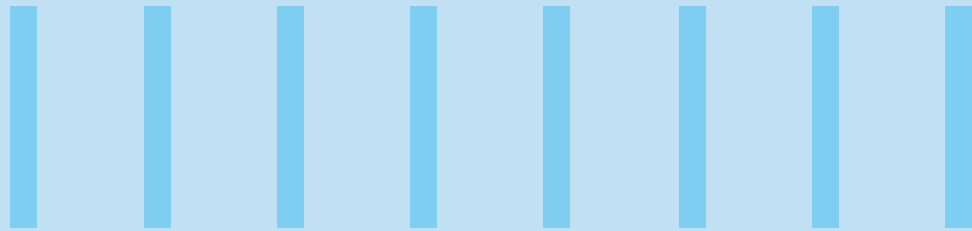




## POV ON ELECTRIC VEHICLE (EV) CHARGING NETWORK





There is an upcoming potential opportunity for utilities in the booming Electric Vehicles (EVs) market. The solution will require the utility to establish and operate an IOT enabled EV charging network in partnership with EV manufacturers, municipalities, real estate/building owners, retailers, telecom players, cloud providers, mobile application developers and clients. The vision is to create an open platform leveraging technologies like IOT, blockchain, mobile and AI that will have the ability to spur revenue growth by expanding into newer services.

With their deep electrical infrastructure experience, ability to offer tariffs based on loads and managing end customer relationships, utilities are best positioned to become a provider of this new cloud EV platform. There would be additional revenue opportunities by bundling services thereby reducing churn. If done

right, these new offerings will provide the needed push to shake off the old stogy image of the organization and improve customer satisfaction.

This strategic transformation will need to focus equally on people, process and technology. People strategies will include both a large scale training on digital technologies and bringing in newer talent with digital transformation experience. This should also include integration of IT and OT teams. Adoption of industry standard processes in customer relationship management (CRM) and asset management would be critical in creating a unified view of client & assets across the organization. The technology will need both transformation in the core areas by adopting cloud native platforms and bringing in newer technologies like Mobile, IOT and AI.

A smart Electric Vehicles (EV) charging

network can bring in a significant new revenue channel for the utility, while giving the organization ability to improve customer experience. This new platform will be built with a combination of new innovative technologies and upgrading the existing infrastructure. It is expected that there will be newer customer touch points (charging stations, mobile apps, etc.) and a new network connecting with partners (EV OEMs, EV charging station manufacturers, building/infrastructure providers, telecom companies, etc.). The organization needs to access the possible risks by building a risk model in order to make this a reliable and safe experience for customers and partners.

The kind of interactions that will happen with the EVs would be based on the services envisaged. These could include vehicle charging, remote health check, software upgrades, media access and fleet management. There could be

vulnerabilities both on the EV to charging station interface and the charging station to backend cloud services interface. A good way to mitigate these would be to support the interface standardization initiatives under progress including ISO 15118 and IEC 61850.

There would be a need to analyze the types of data exchanged between the various actors on this network. This could include customer identification, billing and credit card information, meter data, EV configuration data, commands to EV, firmware and software, access control policies and tariff data. The criticality of impact of tampering each of these data set is different, hence the prioritization and tradeoffs.

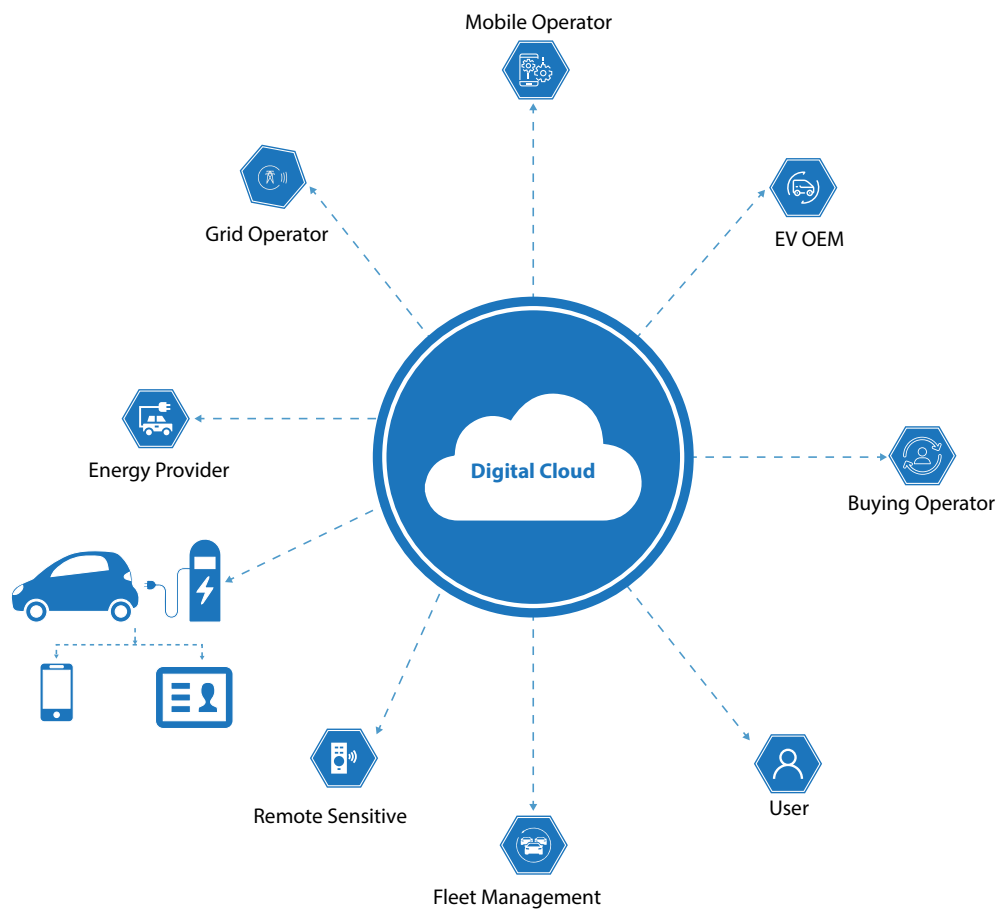
From a security standpoint being a public network all potential threats need to be accessed and mitigations planned. These

include, identity theft, device hijacking, permanent denial of services (DoS), application level distributed denial of service (DDoS) and man in-the-middle attacks. Some of the counter measures that could be planned include implementing authentication, access control, encryption, continuous security monitoring and analysis. Failing to look into this critically could have a negative impact on the utility's grid infrastructure and IT systems.

Over the years both IT and OT teams have implemented their projects without taking into cognizance the capability available in the other team and the need for integration. For example; the smart meter program was implemented using the subsidies provided by the federal government, but the backbone infrastructure to handle the large amounts of data was never planned. Thus limiting

the full potential use of the IOT sensors capable of providing new insights to improve customer service and data to business for launching newer offerings. Combining these two technology teams into a single capability group will (IT-OT) be necessary for implementing any effective IOT initiative.

For implementing a smart Electric Vehicle (EV) charging network the utility will need to bring together some of the key stakeholders including the building real estate provider, grid operator, mobile operator and the consumer. The business case for the EV charging network will need to indicate the scale of investments expected by the key players and the expected revenue share among them. Implementing a blockchain network between parties and devices will reduce the cost of reconciliations and provide transparency.



For IT and infrastructure teams there is a need to create a conversation around connectivity and role of a centralized cloud based platform. Discuss the data being collected and exchanged between devices and parties (ex. credit card data, user identification, commands to EV, software updates, etc.), the need for adoptig standard protocols (ex. ISO 15118 and IEC 61850), also possible security issues

(DoS, man in the middle, etc.) and need for appropriate interventions (ex. encryption, authentication, etc.).

The cloud EV network provides the utility leadership a tool to push the much needed impetus digital transformation of the organization. Painting a picture of this IOT network will help them align towards the organization goals of cleaner energy, battling future competition from battery

providers, grid modernization and creating newer revenue channels.

The network would evolve in future with the addition of newer players providing value added services. This could include the EV OEM (Car manufacturers) collecting usage information, providing software upgrades, etc.; EV Fleet provider (like Zip car) and remote EV repair or breakdown services

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