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CONSUMER PRIVACY ARCHITECTURE FOR POWER GRID ADVANCED METERING INFRASTRUCTURE

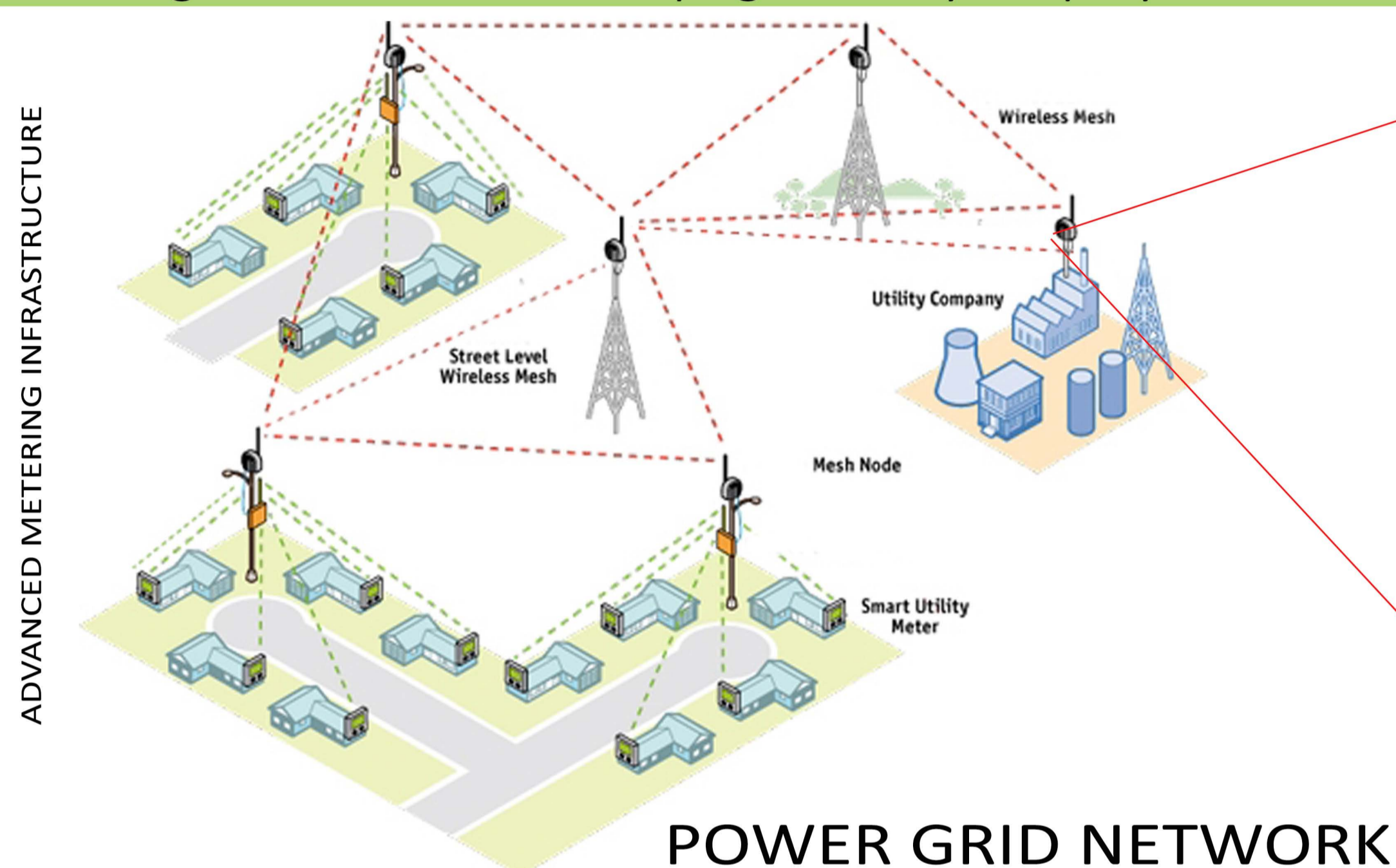
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Background

Utilities install smart meters in homes. These smart meters allow the tracking and management of the energy consumption of the consumers. This will enable the utility companies to increase efficiency, lower costs, and reduce pollution. But the advanced meters, which use wireless and digital technologies to send frequent consumption data to utilities, face opposition from customers and others who see them as a threat to health, privacy, and security. From a utility company perspective, collection and management of such huge volumes of data at an individual level is not an essential business function. The goal of this research is to create an architecture preserving privacy of the consumer in the power grid advanced metering infrastructure while helping the utility company better manage data.



The Problem: Big Data Rush and Threat to Privacy



Smart meters record near-real time data on consumer energy usage and transmit the data to utilities through communications networks that serve the smart grid. The volume of this data poses data management difficulties for the utility companies. Detailed energy usage data allows a peep into the lives of people inside of a home by revealing what individual appliances they are using, and the transmission of the data potentially subjects this information to interception or theft by unauthorized third parties or hackers.

Importance

Consumer perspective:

* By 2015, the Institute for Electric Efficiency expects that a total of 65 million smart meters will be in operation throughout the United States.

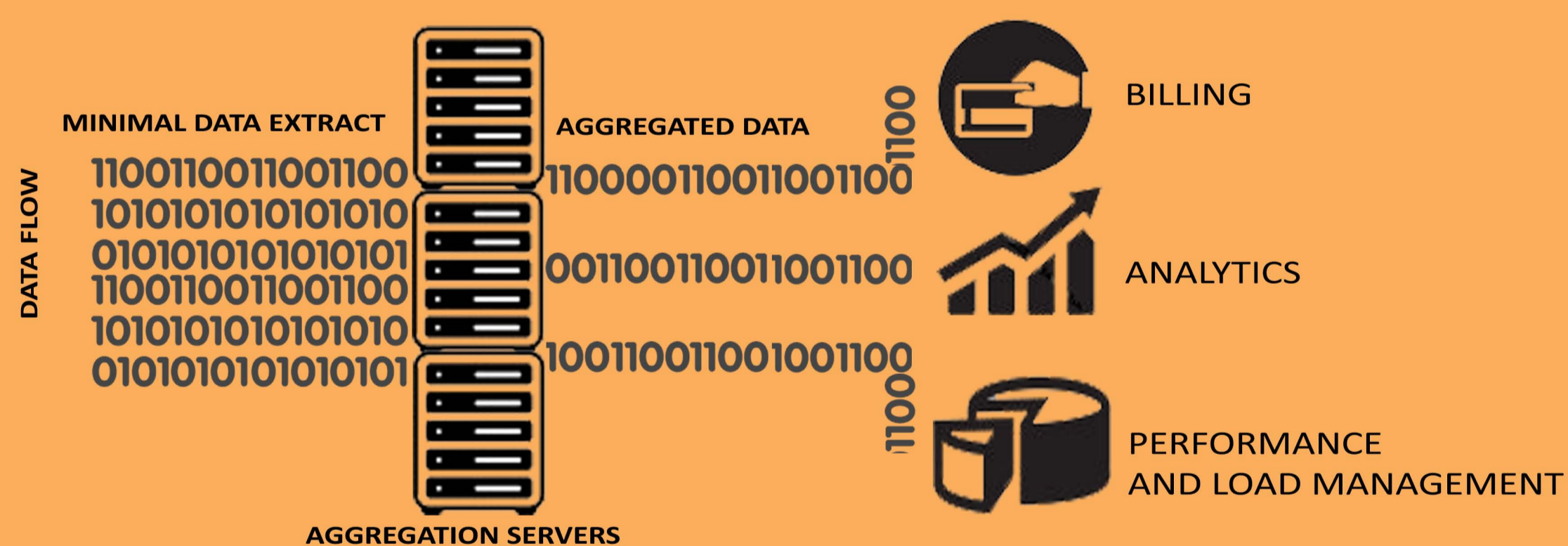
* Privacy concerns have been rising with respect to smart meter installations and data collection. There are concerns that consumer energy usage details can be posed open to consented third parties which includes mail houses, debt collectors, data processing analysts and government agencies.

Utility Company perspective:

* Some smart meters send utilities a snapshot of customers' energy usage every 15 minutes, while others may collect hourly energy information. Such sort of information is not essential for performance and load management

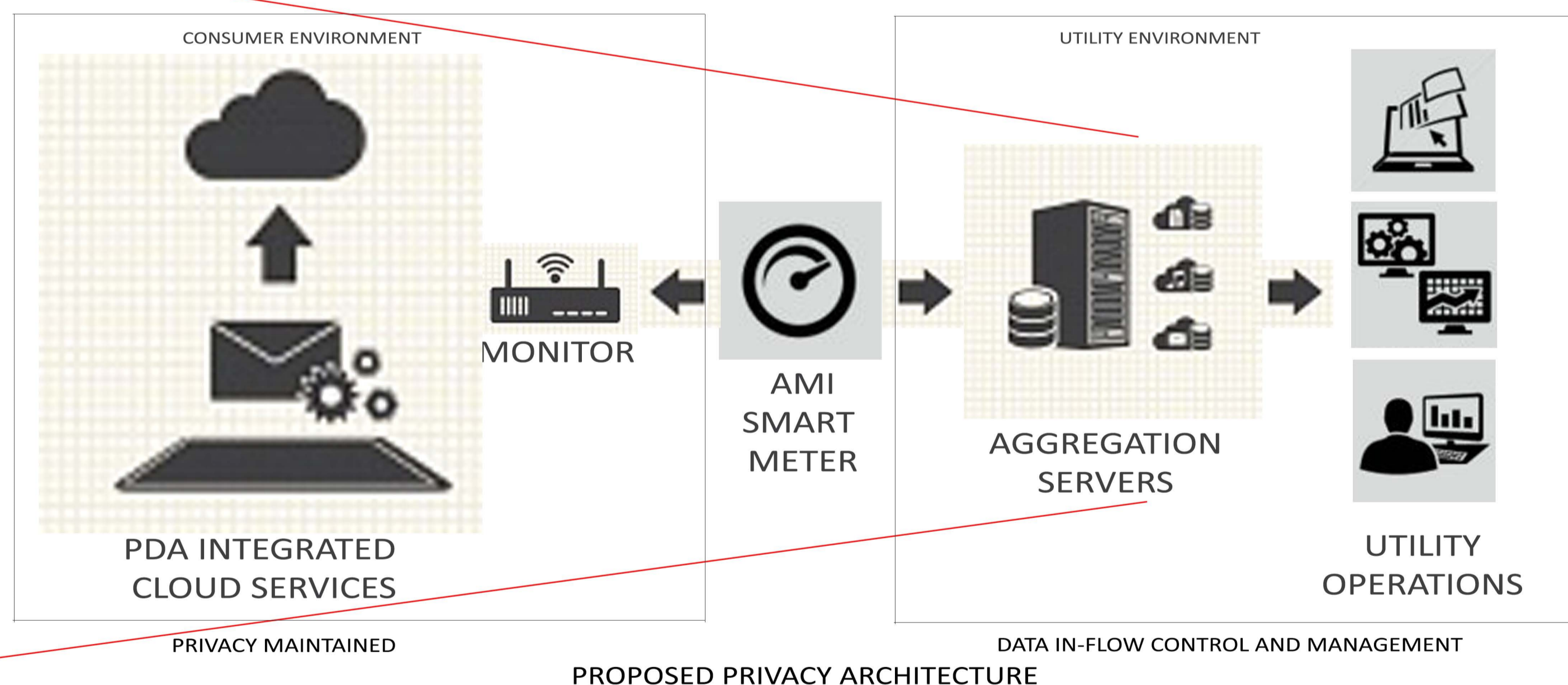
* Managing such huge volumes of private data of energy consumption of consumers in recent years has become unmanageable. Most of the data required by the utility companies are mostly at an area level to manage power production and load management. Individual consumer energy usage data is only of interest in case of billing or other anomalies like unusual levels of consumptions.

Privacy Vs Data Management : The Win-Win Solution



The proposed privacy architecture stresses on data aggregation at a more holistic level. The consumer environment holds the data at an individual appliance usage level while the utilities receive aggregated data at reduced frequencies necessary to operate and continue the utility business functions like billing, analytics, load management or performance. This architecture not only provides privacy at a consumer level but helps the utility control and manage the huge amounts of in-flow data. Thus a win-win solution for both the consumer and the utility company.

SEPERATE DATA FLOW ENVIRONMENTS



PROPOSED PRIVACY ARCHITECTURE

Data Flow and Operations

The data flow in this privacy architecture is separated for the consumer and the utility environments. This architecture provides privacy to the consumer while reducing the big data problem for the utilities by aggregating the data and allowing only essential data reach the utility.

