

A real time architecture for smart energy management

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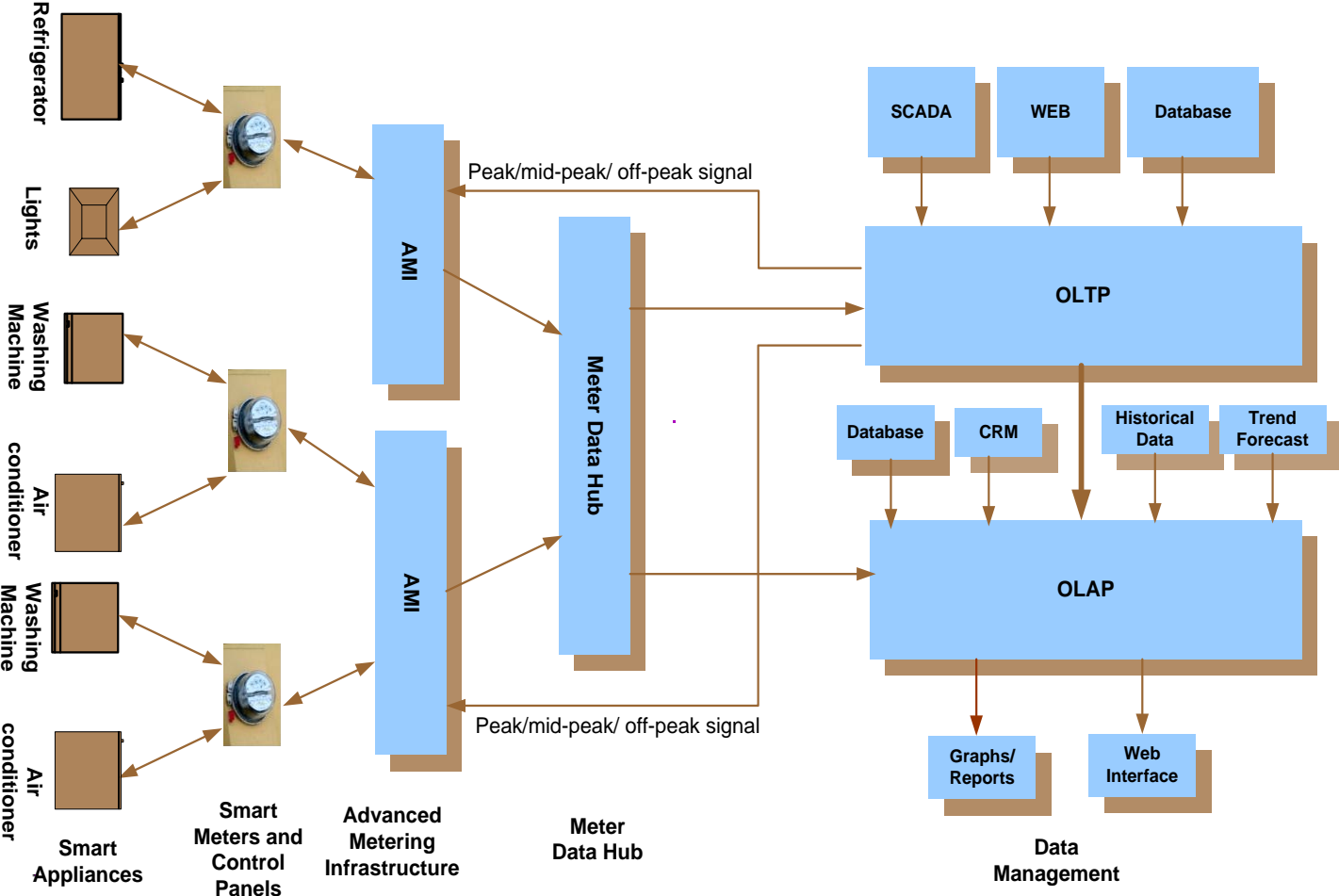
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Introduction

Current Scenario

- Demand Supply mismatch widening by the day
- Supply cannot be scaled quickly
- Supply mainly fossil fuel driven
- Transmission and distribution losses
- Lack of timely information for suppliers
- Insufficient information and choice for customers
- More emphasis on distribution automation

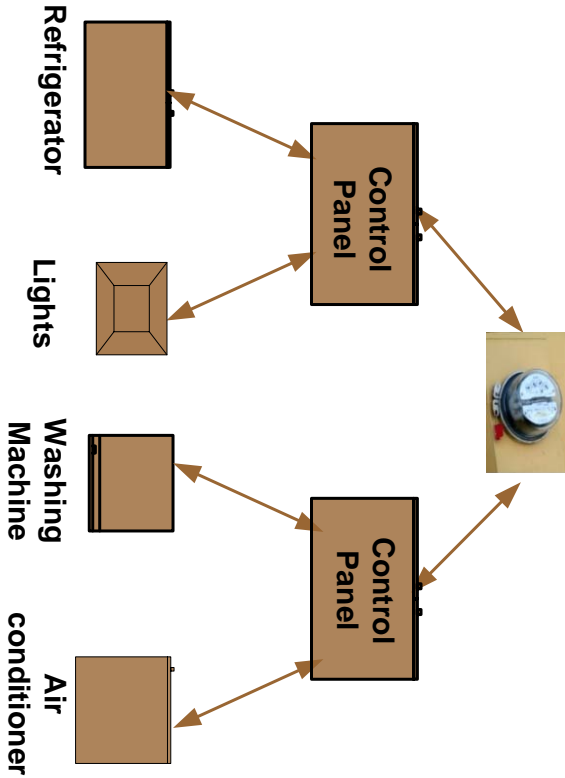
Real Time Architecture for Smart Energy Management



Salient features of Architecture

- End to end data capture
- Facilitates local and global optimization
- Communication between smart appliances and smart grid
- Effective use of smart (programmable) appliances
- Dynamic demand re-distribution
- Specialized OLTP for Supply side automation
- Extensive analytics for customer insight

Smart Appliances



- Ability to react to local conditions
- Programmable appliances
- Generate and transmit consumption information
- Demand response
- Two way communication with programmable control panel
- Reduce cognitive load on customers
- Smart reaction to critical conditions

Smart Meters

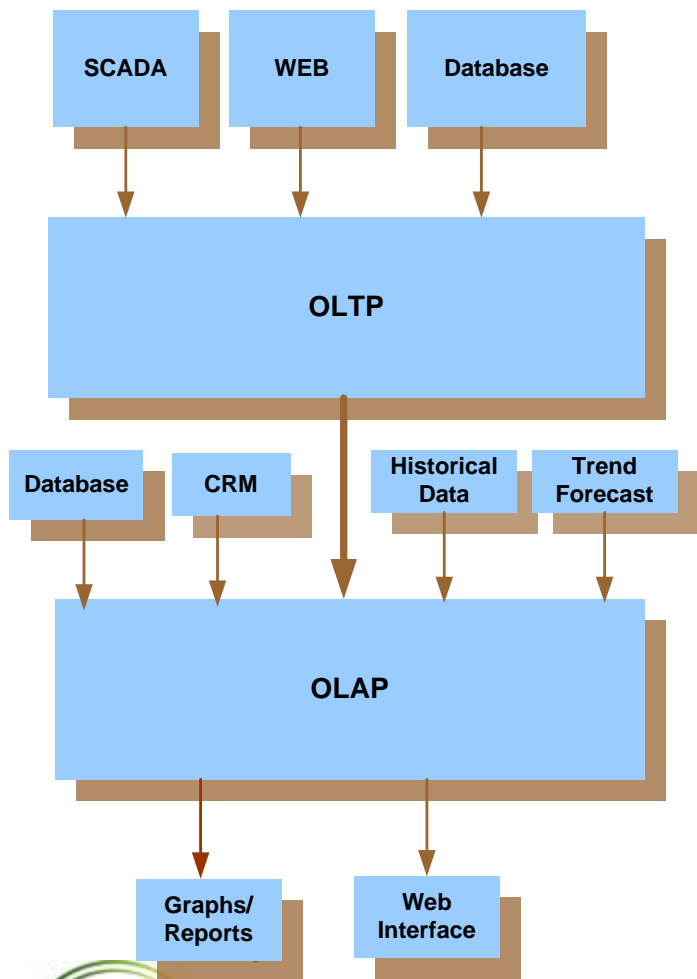


- Capturing and reporting interval data
- Two way communication with AMI
- Displaying real time pricing and consumption information to customers
- No need for manual data reading

AMI and Meter Data Hubs

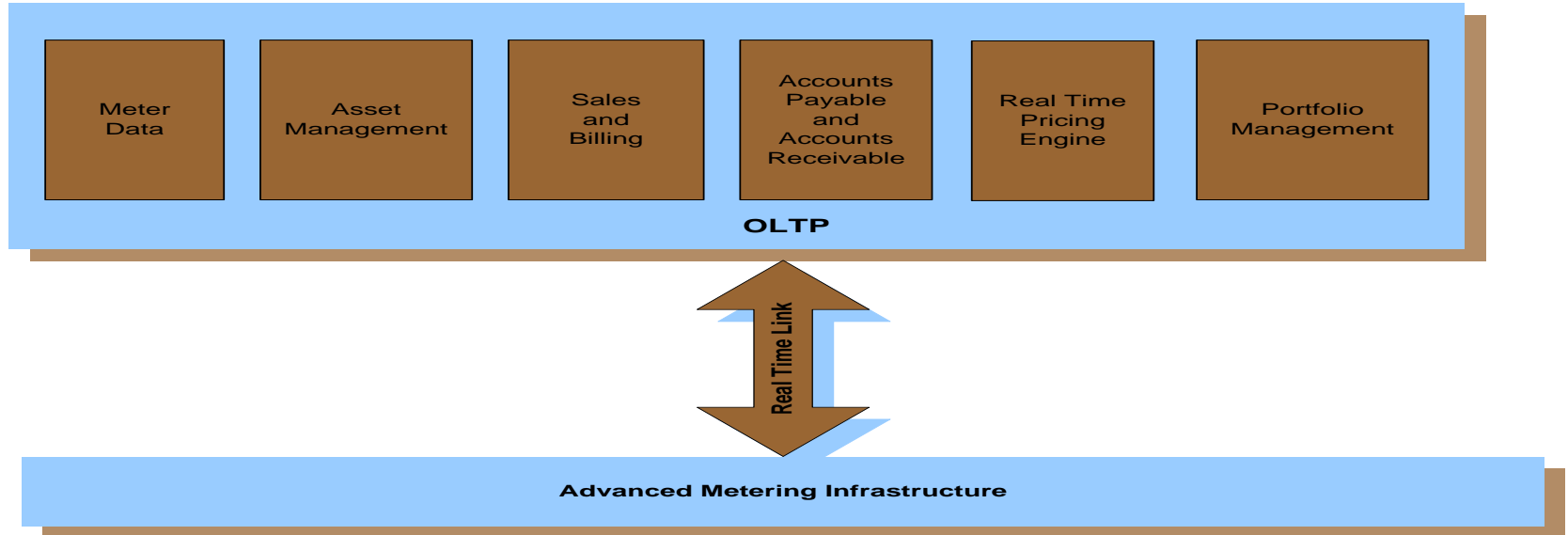
- Central nervous system - Two way communication between smart meters and OLTP
- Meter hubs collect customer and appliance level data
- Meter hubs aggregate collected data and send it to OLTP
- Transmit demand and pricing signal from supplier OLTP systems to smart appliances
- AMI can also be used in place of SCADA to transmit supply information collected at various nodes to OLTP systems

Data Management and Analysis



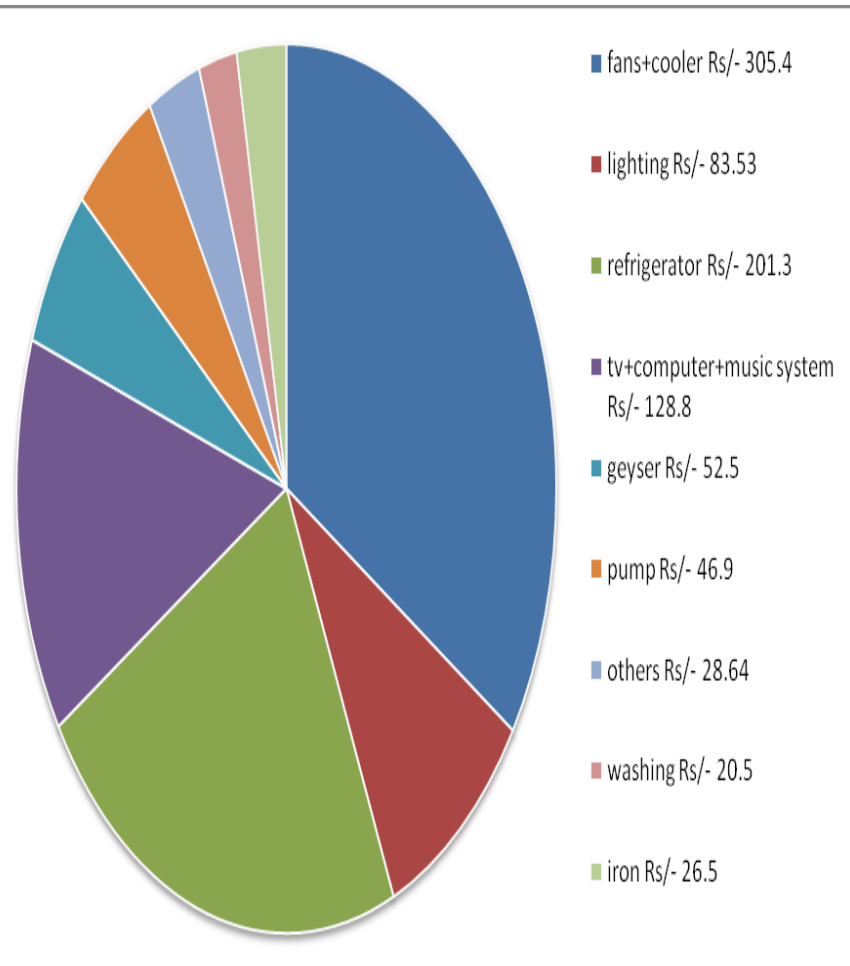
- Determination of peak/mid-peak and off-peak load in OLTP using aggregate supply and demand data
- Real Time Pricing - Integration of pricing data and load data in OLTP
- Analyzing customer and appliance data in OLAP
- Real time reporting
- Extensive analytics for customer and supplier insights
- Trend forecasting

OLTP for Utilities



- Specialized modules for handling meter data
- Real time determination of peak/mid-peak and off-peak load in OLTP using aggregate supply and demand data
- Integration of pricing data and load data in OLTP
- Real time reporting
- Trading modules

Real time reporting, feedback and Billing Analysis



- Deep insight into consumption patterns
- Customer can easily interpret costs per appliance
- Providing suggestions for decreasing or re-distributing consumption to lower energy costs
- Obtain real time information through multiple channels like internet, mobile
- Customers can understand appliance performance and benchmark

Conclusions



- Smart appliances and home automation are an integral part of smart energy management
- Balance of local (smart appliances) and global (supplier driven) energy optimization
- Energy optimization at different levels of granularity
- Real time information feedback to consumers regarding consumption and its costs can help redistribute demand and lower peak consumption
- Reduced variability in consumption leads to lower operating costs for suppliers
- OLTP to determine load conditions and prices in real time and relay it to select customer groups
- Use OLAP for extensive consumption analysis and demand forecasting

Thank You



Authors



D .Y .Raghavendra Nagesh is a Principal Architect in Business Intelligence .His interests are Business intelligence, Data Warehousing Architecture ,Energy Management Information System, Real time data Analysis, Smart Grid and Voice Reports. (e-mail: dyraghavendra@yahoo.com)



J.V.Vamshi Krishna is a consultant in Enterprise Architecture. His interests are design and architecture of complex business systems and system dynamics. (e-mail: vamshi@gmail.com)



Dr S.S.Tulasi Ram is Professor in JNT University, and his current research areas are Power Quality and Energy Management systems. (e-mail: ramsankara@gmail.com)