A Fine-grained Privacy Protection Data Aggregation Scheme for Outsourcing Smart Grid

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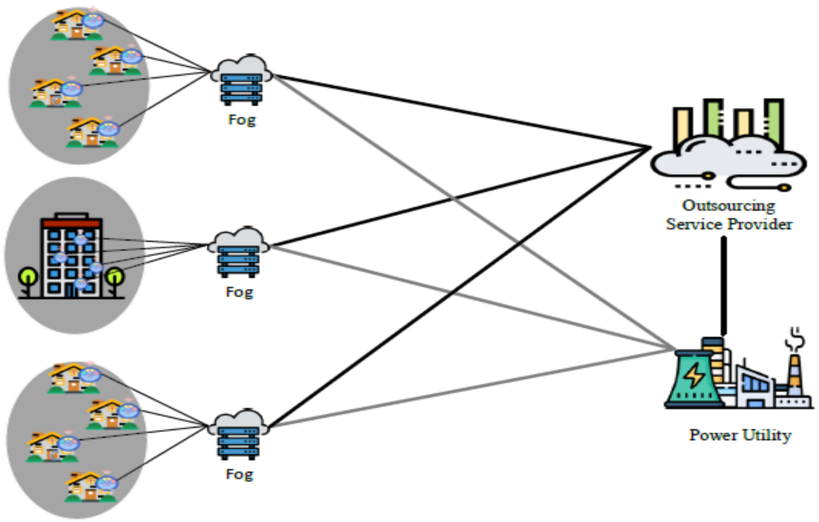
Problems & Ideas

- Problems of the existing data aggregation schemes in smart grid:
  - Cannot get fine-grained aggregate data based on user characteristics.
  - Blind factor is used to enhance the privacy protection, while ignoring the fault tolerance of the scheme.
- Ideas: A fine-grained data aggregation based on user characteristics, and solves the problem of fault tolerance through the use of user relative location list



The fog server performs fine-grained data aggregation according to user characteristics and aggregation rules, sends the obtained aggregation ciphertexts to the outsourcing service provider, and sends the corresponding user relative location lists to the power company to generate a deblinding factor.

Main Contributions

- Contributions:
  - The proposed scheme can perform fine-grained data aggregation based on user characteristics and provides more fine-grained analysis data for real-time pricing
  - Different from the existing schemes, the proposed scheme can not only resist the collusion of fog servers and service provider, but also ensure the fault tolerance of the scheme.
  - The proposed scheme designs a secure bill generation scheme that can protect user privacy.

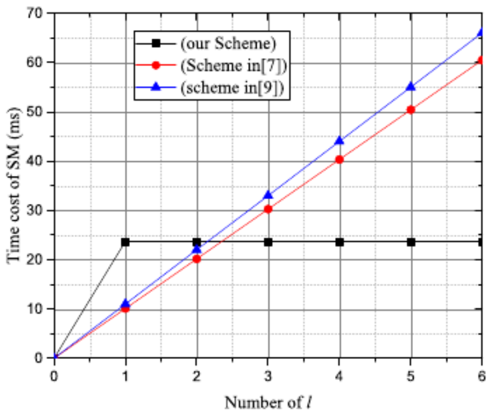


Fig. 3 Computation cost of SM

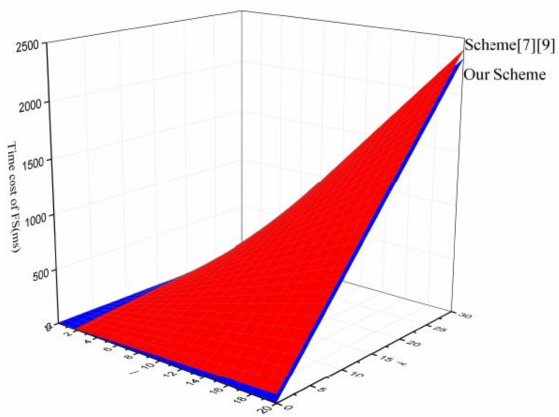


Fig. 4 Computation cost of FS

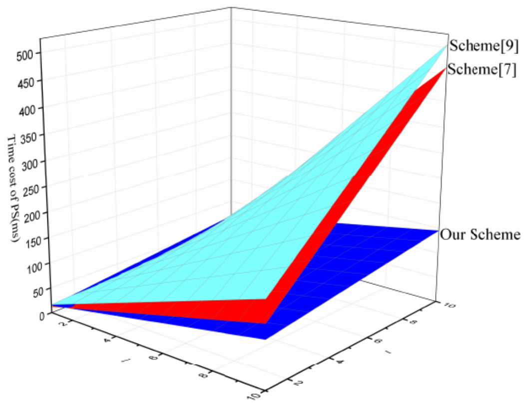


Fig. 5 Computation cost of PS

From left to right, it shows the relationship between the computation cost of smart meter, fog server and service provider and *l* (number of aggregation rules), *k* (number of smart meters) and *t* (number of fog servers).