OBJECTIVES

- Develop an optimal decision making tool for distribution system operations in Smart Grids.
- Incorporate unbalanced system operation in the model development.
- Propose a solution method for the optimization problem to facilitate practical implementations.

SOLUTION METHOD

- Nature of the Problem:
  - Proposed DOPF model is an MINLP problem.
  - LTC positions are discrete (-16 to +16).
  - Capacitor blocks in SCs are discrete (1, 2, 3 ..).
  - Associated with large number of variables even for a small distribution system.
  - Number of variables increase for 24-hour optimization problem.

- Converting MINLP to NLP problem:
  - Commercially available solvers (BARON, DICOPT) did not perform well in terms of solution time and convergence characteristics.
  - A quadratic penalty function is used.
  - Integer solution to NLP problem is obtained.
  - Integer solution may lie outside feasible space.

- Proposed Local Search:
  - In order to make sure that the obtained optimal solution lie in feasible space.
  - Search was carried out in the neighbourhood of the obtained solution (integer variables).
  - The search space is still huge due to the large number of integer variables and 24-hour optimization problem.
  - An hourly local search procedure is employed which reduces the search space substantially.