Paris Session 2022

Smart meter as a voltage censor for OLTC operation: Mitigation of voltage violation under massive penetration of PV

C6

PS2 Q2-10

Hideo ISHII, Japan

Group Discussion Meeting

Smart Meters in Japan (replacement to be completed in 2024)

◆B-route communication
➢Low voltage : Wi−SUN+Wi-Fi2.4GHz
➢High voltage : Ethernet+Wi-SUN

◆Collected data / offering time
➢P, Q, V : 30min resolution / within 1 hour
+ 5min resolution
10% customers / within a few days

HEMS etc.

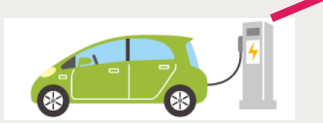
B-route

A-route

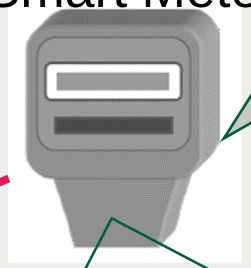
Smart Meter

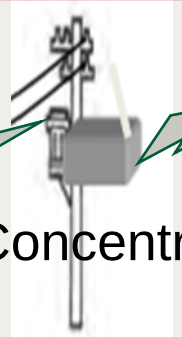
IoT-route

Gas/Water meter



Resources





Concentrator

HES

MDMS

Retailors etc.

Gas

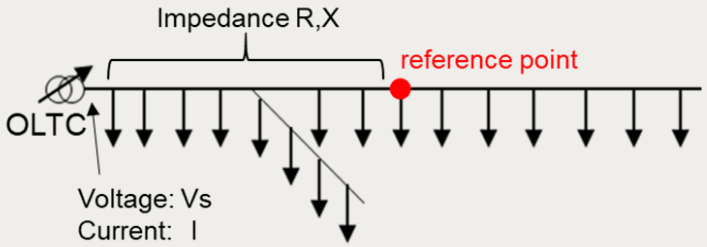
Water

◆Exchangeable communication unit
◆Acquired data
➢Low voltage : P, Q, V
Resolution 1min/5min/15min/30min
➢High voltage : P, Q
Resolution 5min/15min/30min

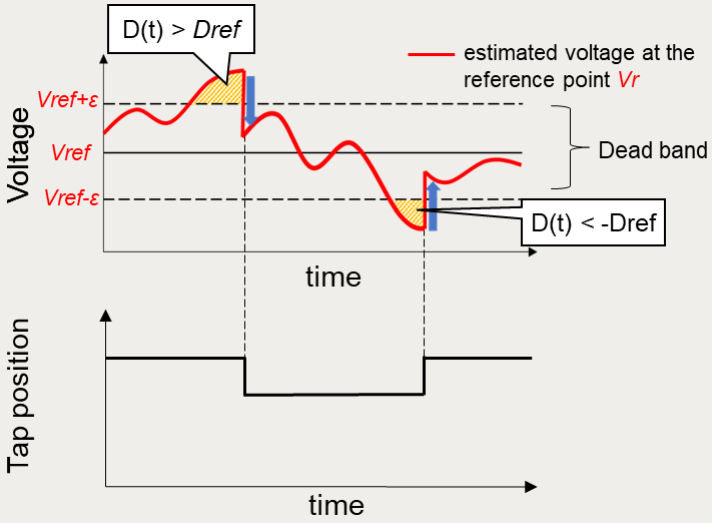
*Red part : added for next generation meters

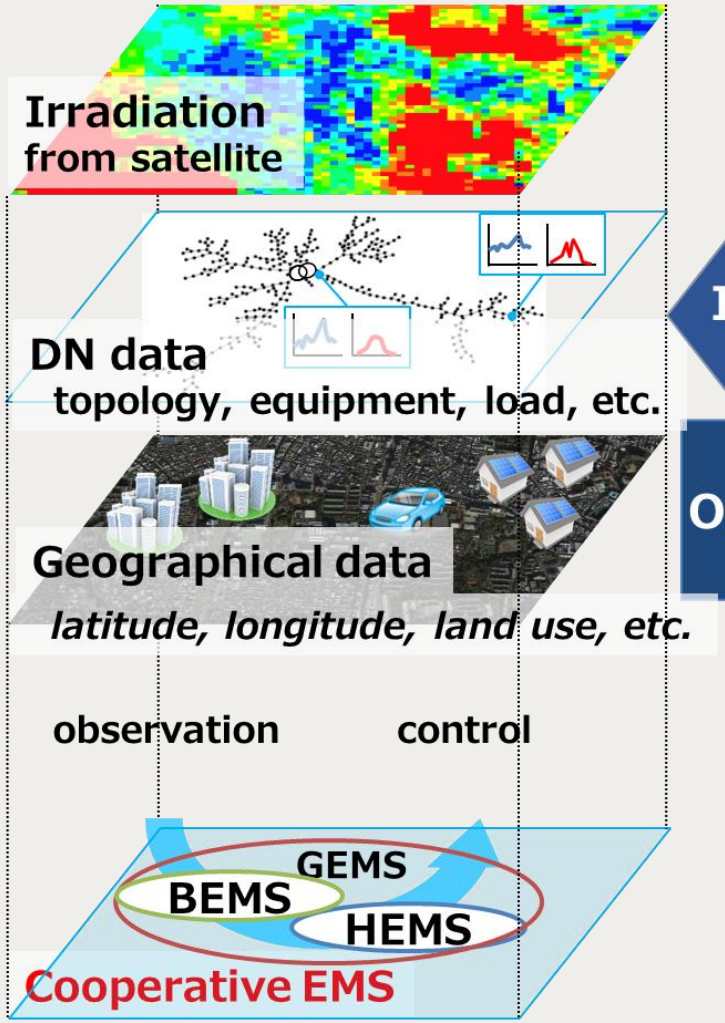
Cooperative EMS Simulation Platform

- OLTC Control Method (LDC)



$$V_r = \left| \dot{V}_s - (R + jX)\dot{I}_s \right|$$



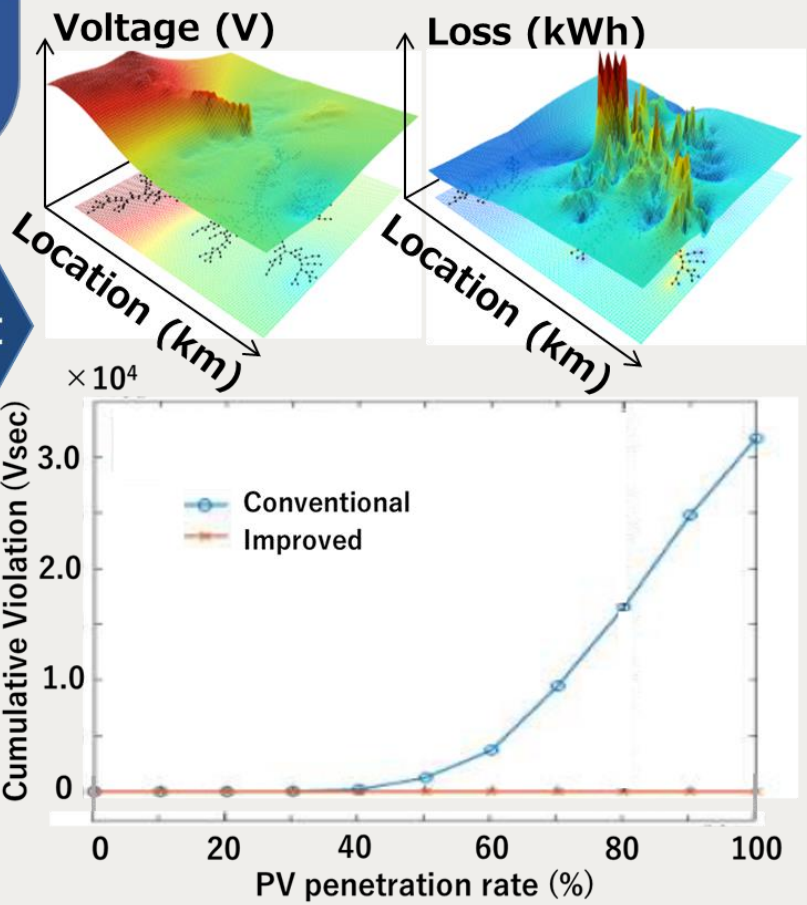


Simulation settings

- ✓ Volume & Distribution of PV･EV
- ✓ Electrification of water heaters etc.

Input

Output



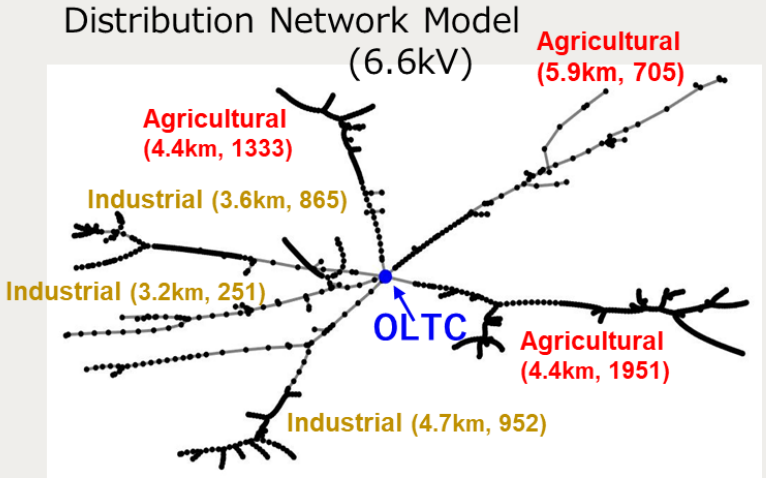
Application of next generation smart meter data

p Cases employed

Case	Voltage data resolution	LRT Parameter update
30min	30min	Seasonal
30min_TB	30min	Seasonal＋Time based
5min	5min(10%)+30min(90%)	Seasonal
5min_TB	5min(10%)+30min(90%)	Seasonal＋Time based

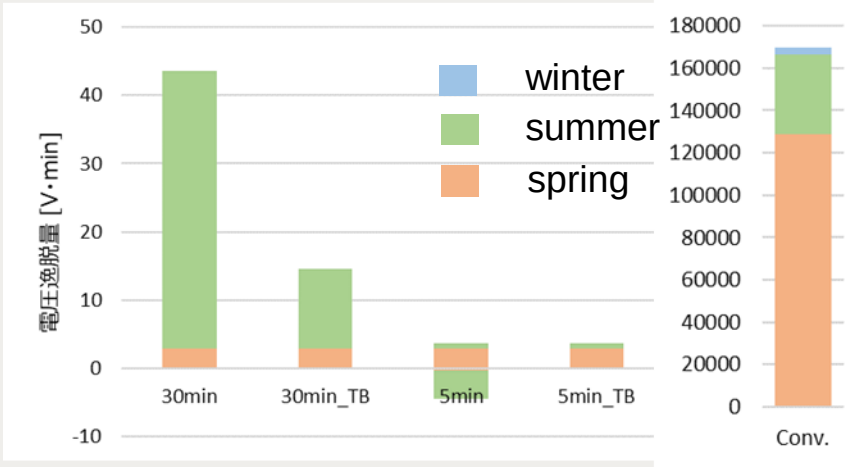
Reference(Conventional) : LRT is controlled with the parameters optimized for no PV case

p Model Distribution Network

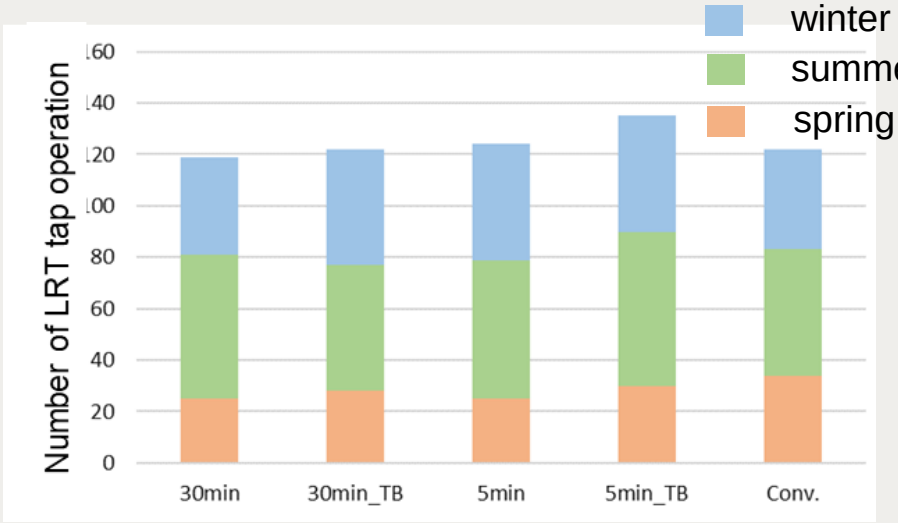


PV: Installed to 25% of customers in agricultural area from the edge of the feeders

p Simulation Results



(a) Cumulative Voltage Violation



(b) Number of LRT tap operation