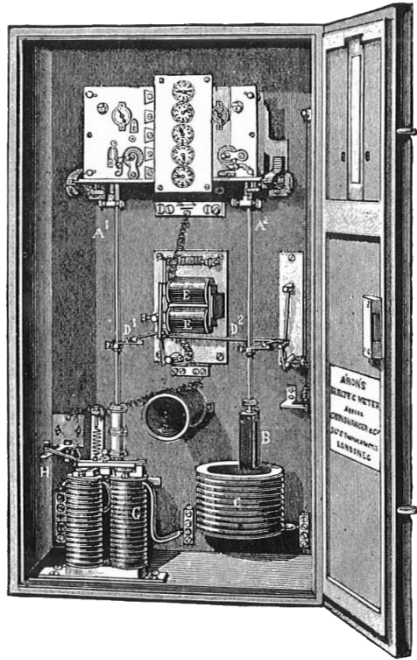


# From billing data to smart era data

Pavol Babarík

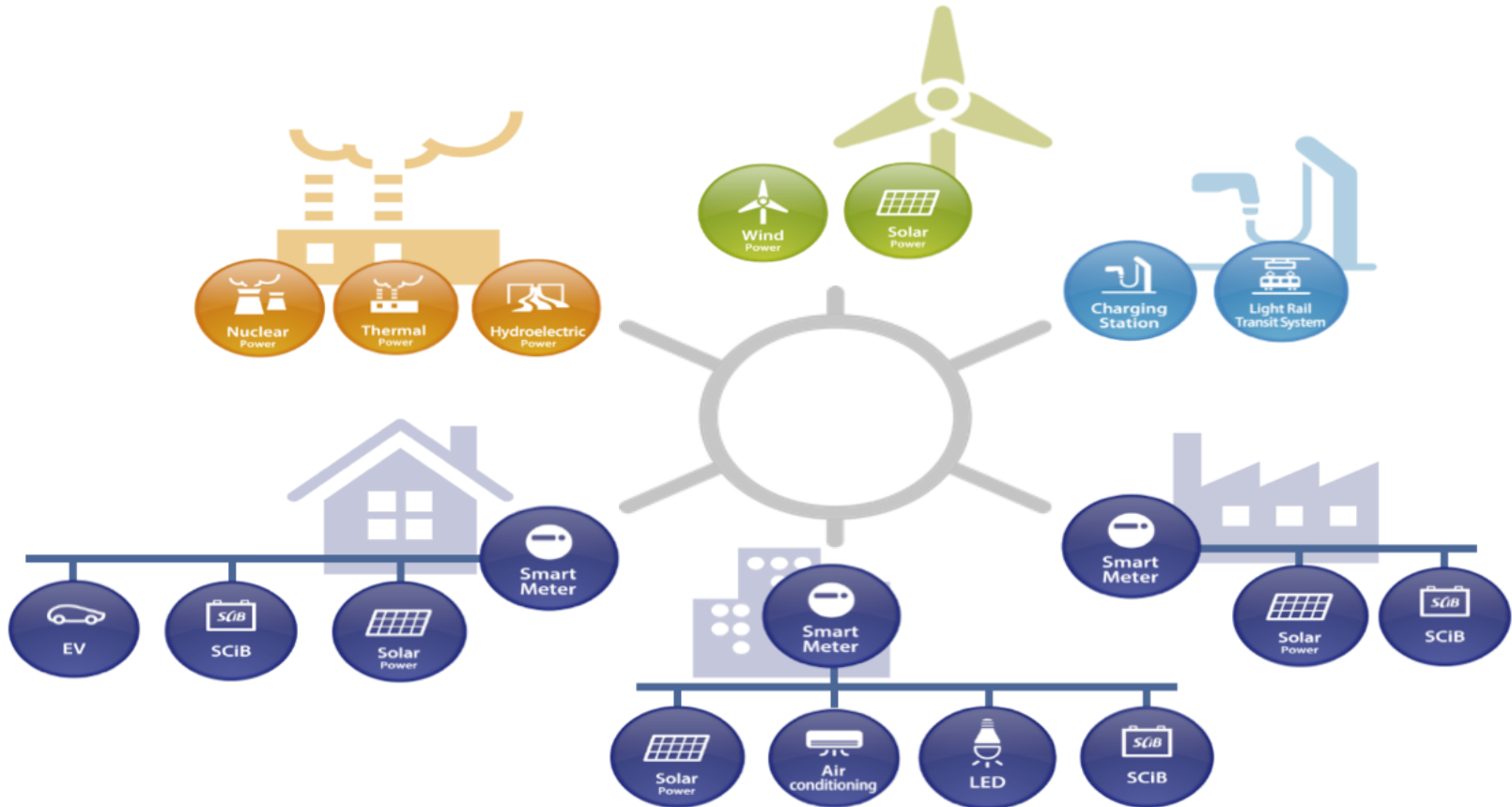


## Traditional

- PSTN
- GSM
- GPRS
- LAN



# ...gets more complicated



## Smart Grid

- Real time management
- Distributed network
- Smart Home

### Advanced functionality

- Load balancing
- Dynamic tariffication

### Smart Metering

- Monthly billing
- Consumer services

### Smart infrastructure

- Smart meters



## Smart meters

- PRIME
- PLAN
- G3

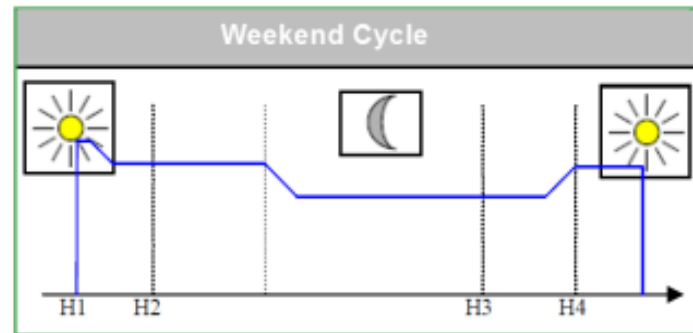
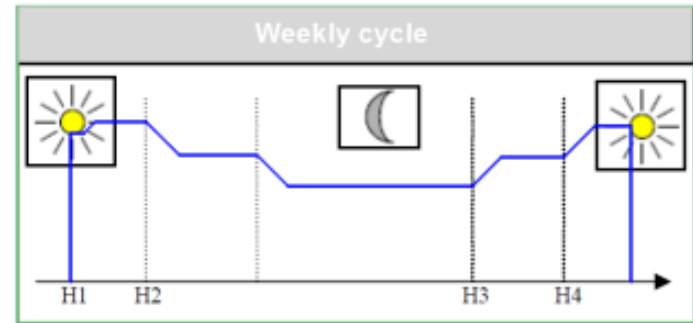


## Lighting needs vary according to

- Sunset and sunrise
- Local geography (mountains, lakes...)
- Moon cycles
- Seasons
- Human activity...

## Additional functions requested

- Light sensor with failure detection
- Control of light operation
- SMS sending in case of problems
- Consumption follow-up



# Basic requirements for street light : The Concept

## Equivalent functionalities of:

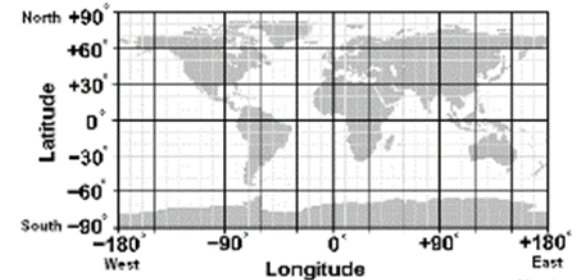
- A meter
- A Ripple Control Receiver
- An astronomical clock

## Astronomical clock

- Variation according to date over the year
- Geographical location (latitude and longitude  $\pm 0.001^\circ$  )
- Accuracy  $\pm 3$  min for latitudes below  $\pm 60^\circ$  (max  $\pm 70^\circ$ )

## Control 2 Astronomical signals

- Astro1 and Astro2
- 2 independent Offsets ( $\pm 480$ min)
- Used for 2 different modes:
  - 1 for standard night light
  - 2 for holiday lights and pedestrian crossings



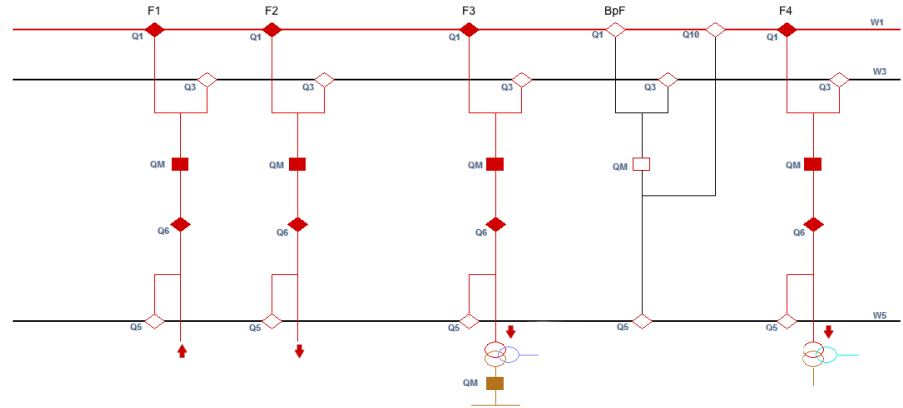


## Communication with SCADA system

- IEC 60870-5-104
- cca. 10 signals for location

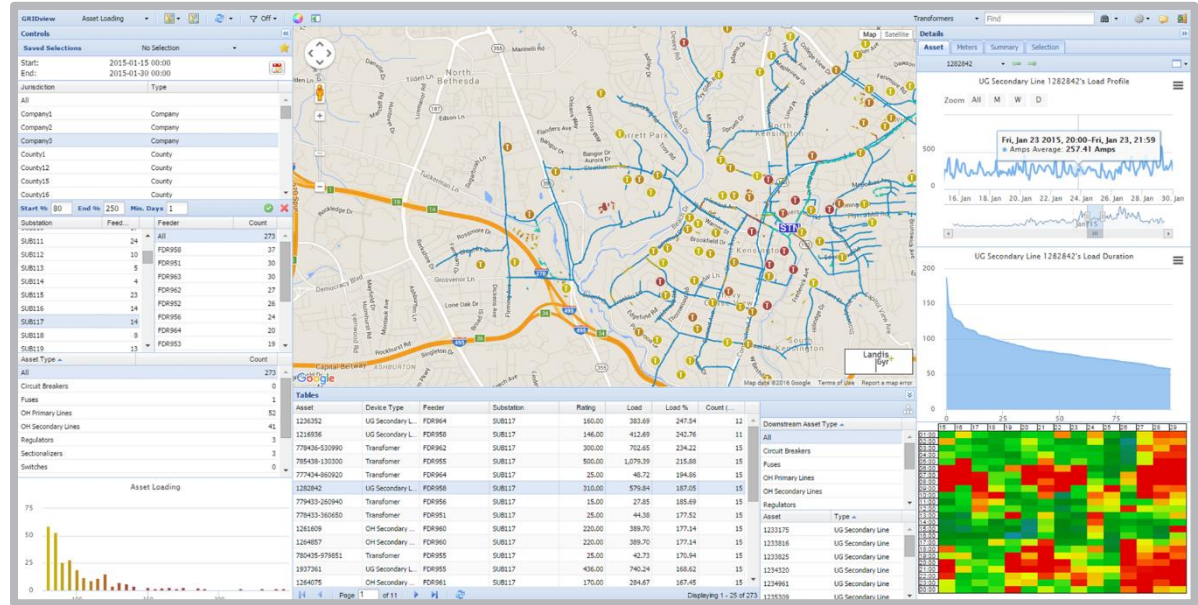
## Transmitted signals

- Position of disconnecter Q1 (BpF Q1)
- Position of disconnecter Q3 (BpF Q3)
- Position of disconnecter Q10 (BpF Q10)
- Position of switch QM (BpF QM)
- Position of disconnecter Q5 (BpF Q5)
- Position of disconnecter Q5 (F1 Q5)
- Position of disconnecter Q5 (F2 Q5)
- Position of disconnecter Q5 (F3 Q5)
- Position of disconnecter Q5 (F4 Q5)



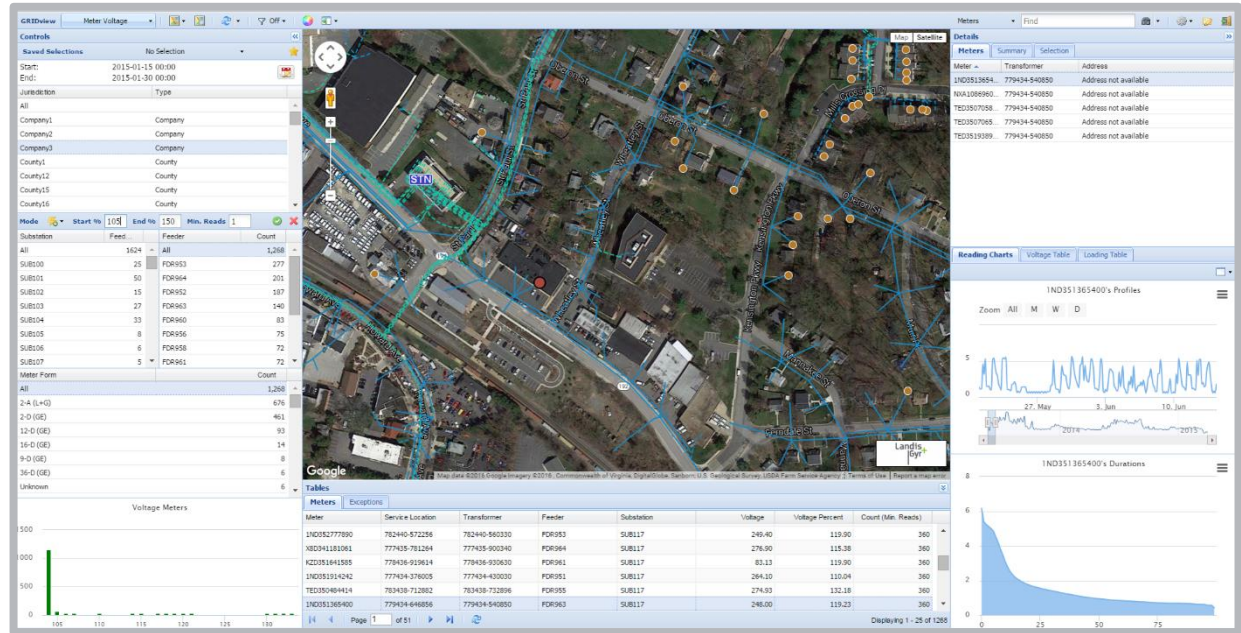
# Asset Loading

- System-wide visibility of asset health, loading and performance analysis
- Identifies over loading to minimize outages due to equipment failure
- Identifies under loading for better asset utilization
- Performs loss of life calculations for economic based decision-making
- Used by engineering, operations, asset management and customer service



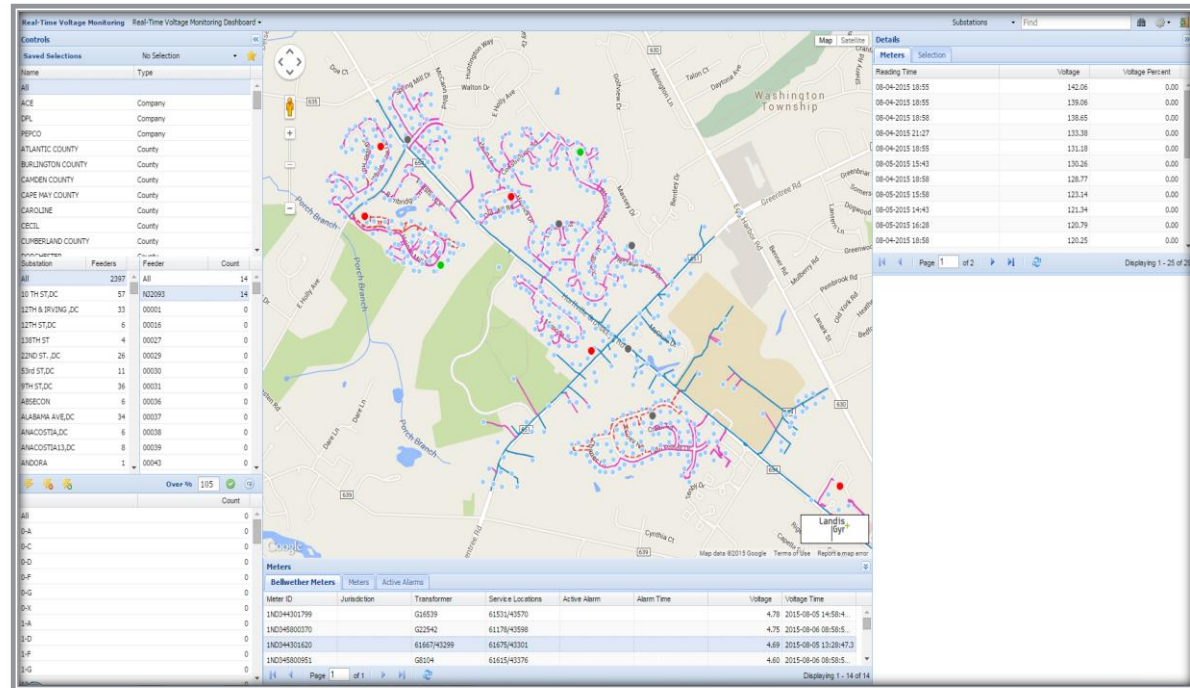
# Voltage Visualization

- Power Quality Analysis and Daily Alerts
- Predict equipment failure by voltage change
- User defined filtering and configuration based on meter types as well as over and under voltages
- Helps determine and prioritize areas for voltage optimization programs



# Voltage Monitoring

- Displays selected meter real-time voltage (5-15 minute) measurements on geo-spatial distribution map for distribution system voltage management
- Provides services to perform a complete system voltage analysis to recommend selected meters for each distribution circuit



**The key is not to get data, but to  
know what to do with it.**

**Thank you for your attention**