Integrated Multipoint Submetering

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February 14, 2017

Agenda

- **What is Sub-metering?**
- **Energy Code Impact**
- **Why meter?**
- **Basic Metering Terms**
- **Multipoint Energy Metering**
- **Communications**
- **Meter demos**
- **Projects**

What is Sub-metering?

Utility submeter - Wikipedia
https://en.wikipedia.org/wiki/Utility_submeter ▾ Wikipedia ▾
Utility submetering is the implementation of a system that allows a landlord, property management firm, condominium association, homeowners association, or other multi-tenant property to bill tenants for individual measured utility usage.

Submetering | Definition of Submetering by Merriam-Webster
www.merriam-webster.com/dictionary/submetering ▾ Merriam-Webster ▾
the retail sale through individual meters to tenants in large office or apartment buildings of electric current or gas purchased for the entire building by the owners ...

Typically the meter after the utility meter

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Energy Code Adoption – State by State

Changes from 2015:

- **9** states have adopted 2013/2015
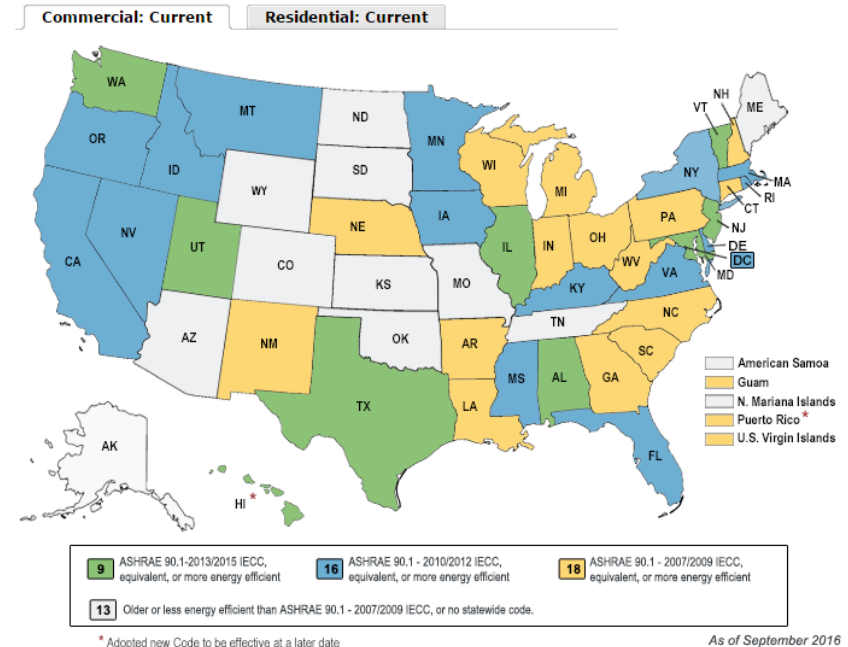
- 2013/2015 Code **MANDATES** tenant metering

CHART: State Submetering Policies

The box allows you to conduct a full text search or use the dropdown menu option to select a state.

texas	Reset	Texas ▾

STATE	SUBMETERING POLICY
Texas	A political subdivision may not authorize the construction or occupancy of a new apartment house, including the conversion of property to a condominium, unless the construction plan provides for the measurement of the quantity of electricity consumed by the occupants of each dwelling unit of the apartment house, either by individual metering by the utility company or by submetering by the owner. This section does not prohibit a political subdivision from issuing a permit to a nonprofit organization for construction of a new apartment house for occupancy by low-income elderly tenants if the nonprofit organization establishes, by submitting engineering and cost data and a sworn statement, that all cost savings will be passed on to the low-income elderly tenants (Tex. Utilities Code Ann. §184.012).

National Status At-A-Glance

The current status of energy codes and standards adoption is shown in the maps below. Status is displayed for both residential and commercial buildings for U.S. States and territories. Choose from the drop-down list to view the details for a particular state.

Commercial: Current	Residential: Current

Legend:
- 9 — ASHRAE 90.1-2013/2015 IECC, equivalent, or more energy efficient
- 16 — ASHRAE 90.1 - 2010/2012 IECC, equivalent, or more energy efficient
- 18 — ASHRAE 90.1 - 2007/2009 IECC, equivalent, or more energy efficient
- 13 — Older or less energy efficient than ASHRAE 90.1 - 2007/2009 IECC, or no statewide code.

Map legend (territories):
- American Samoa
- Guam
- N. Mariana Islands
- Puerto Rico *
- U.S. Virgin Islands

* Adopted new Code to be effective at a later date

As of September 2016

This link provides information on some of the states that regulate tenant sub metering:
http://www.ncsl.org/researchenergy/utility-submetering.aspx

ASHRAE 90.1 Metering Requirements

Section 8 – 8.4.3
Electrical Energy Monitoring

U.S. DEPARTMENT OF **ENERGY** | Energy Efficiency & Renewable Energy

Measurement devices in new building to monitor electrical energy use for each of these separately:
- Total electrical energy
- HVAC systems
- Interior lighting
- Exterior lighting
- Receptacle circuits

For buildings with multiple tenants, the above must be separately monitored for total building and for each tenant (excluding shared systems)

Exception:
- up to 10% of each separate load (other than total) can be from other electrical loads

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BUILDING ENERGY CODES

www.energycodes.gov

https://www.energycodes.gov/sites/default/files/becu/90.1-2013_Lighting_BECU.ppt

ASHRAE 90.1 Metering Requirements

Section 8 – 8.4.3

Electrical Energy Monitoring – Recording and Reporting

U.S. DEPARTMENT OF **ENERGY** | Energy Efficiency & Renewable Energy

- Energy use must be automatically recorded a minimum of every 15 minutes
- Use must be reported at least hourly, daily, monthly, and annually
- Data for tenants must be made available to that tenant
- The system must be capable of retaining data for at least 36 months

9

https://www.energycodes.gov/sites/default/files/becu/90.1-2013_Lighting_BECU.ppt

Why Meter?

- **Benchmark energy usage**

- **Allocate costs to cost centers or tenants**

- **LEED points**

- **PUE determination**

- **Verify energy savings from projects**

- **Encourage conservation**

- **Alarm if limits are exceeded**

- **Monitor quality of power**

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Four Basic Metering Inputs

- **Voltage Reference**
  - **120-600VAC, PTs above 600VAC**
  - **Most common-A,B,C,N Optional-G**

- **Current Inputs**
  - **5A, 1A, 333mV, other**
  - **A,B,C, Measured or calculated-N,G**

- **Control Power**
  - **120-240 VAC, 24-48 VDC, Higher VAC and VDC**

- **Communications**
  - **Serial-Modbus RTU, BACnet MSTP**
  - **Network-Modbus TCP, BACnet/IP**

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Common Sub-metering measurements

- **Voltage**

- **Current**

- **Watts**

- **Demand**

- **Watt-hour**

- **Power Factor**

- **Pulses from other meters**

Product Capabilities

Price

Energy-Multipoint Meter

- Where energy usage and utility charges are of primary concern
- Submetering individual loads
- Allocating cost to cost centers or tenants
- Disaggregating Loads-plug, lighting, mechanical
- Alarming on energy/current thresholds
- Energy feed into existing software

Characteristics

- Industry standard communication
- Configurable metering-1P, 2P, or 3P
- High density, up to 100 meter points per system
- Front panel LEDs provide status of unit and communication activity
- Scalable metering-6 pole increments
- Web Interface
- Cost Allocation

Integrated Multipoint Metering offers space savings compared to Meter Stacks

Multipoint meter application in switchboard
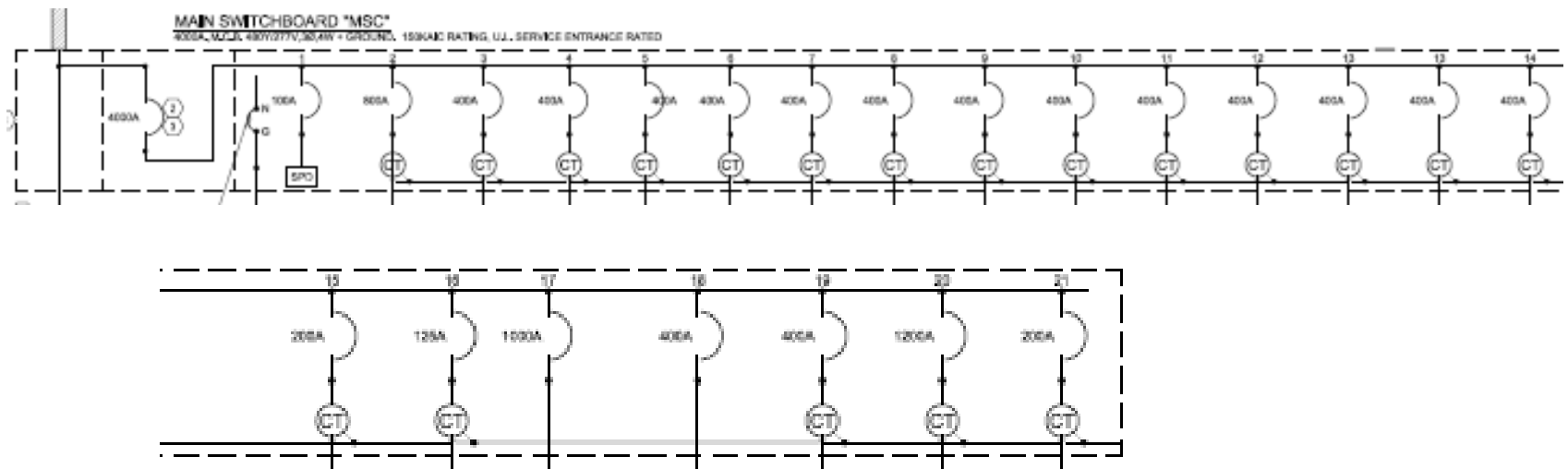
Multipoint meter embedded in Main Switchboard

Multipoint meter application in switchboard

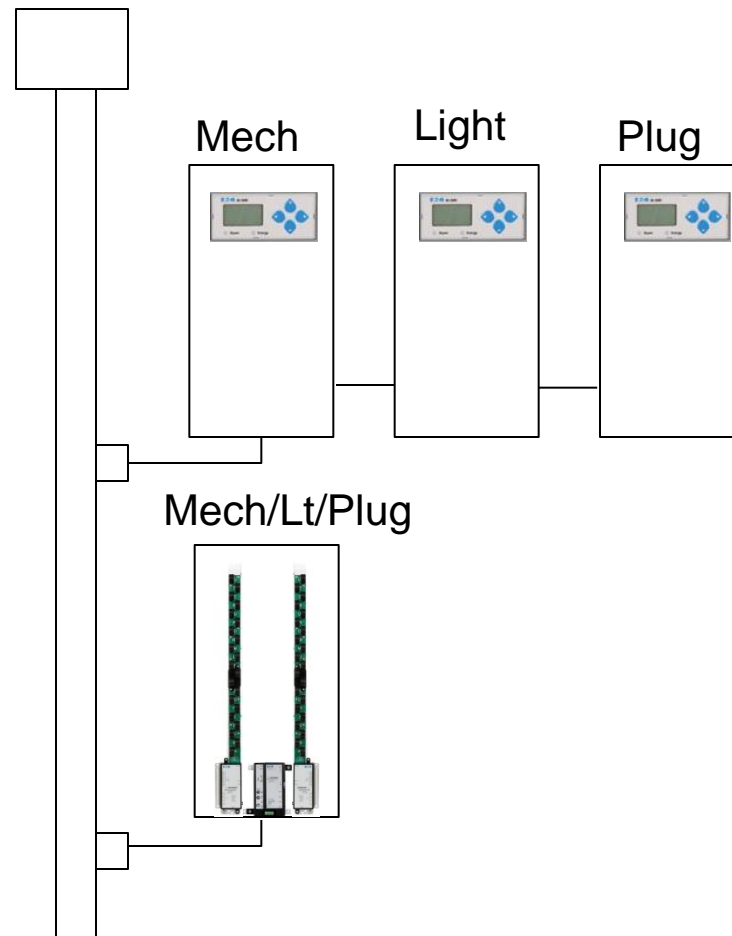Color touch screen display for viewing system and tenant metering values.

Current sensors are connected to the meter. This will eliminate timely installation cost.

The current sensors are mounted on brackets in-line with the tenant breaker. Cable installation is made easy!

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Multipoint meter application in Enclosure

One Multipoint meter per
floor or locate on mid
floor level and run CTs up
and down floors for more
cost effective solution

Multipoint Metering Panelboard Design Considerations

Mech

Light

Plug

Mech/Lt/Plug

Integrated Metering in Electrical Equipment

Panelboard Submetering

Flexible Submetering for Energy Use-PRL4 & SWBD

Flexible Submetering for Energy Use-PRL1/2/3

Low Profile Energy Meter-PRL1/2/3

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Enclosed Meters

Application

- Where no metering compartment or mounting space is available in the existing electrical distribution equipment
- Where installation time is a premium
- Where energy usage and utility charges are of primary concern
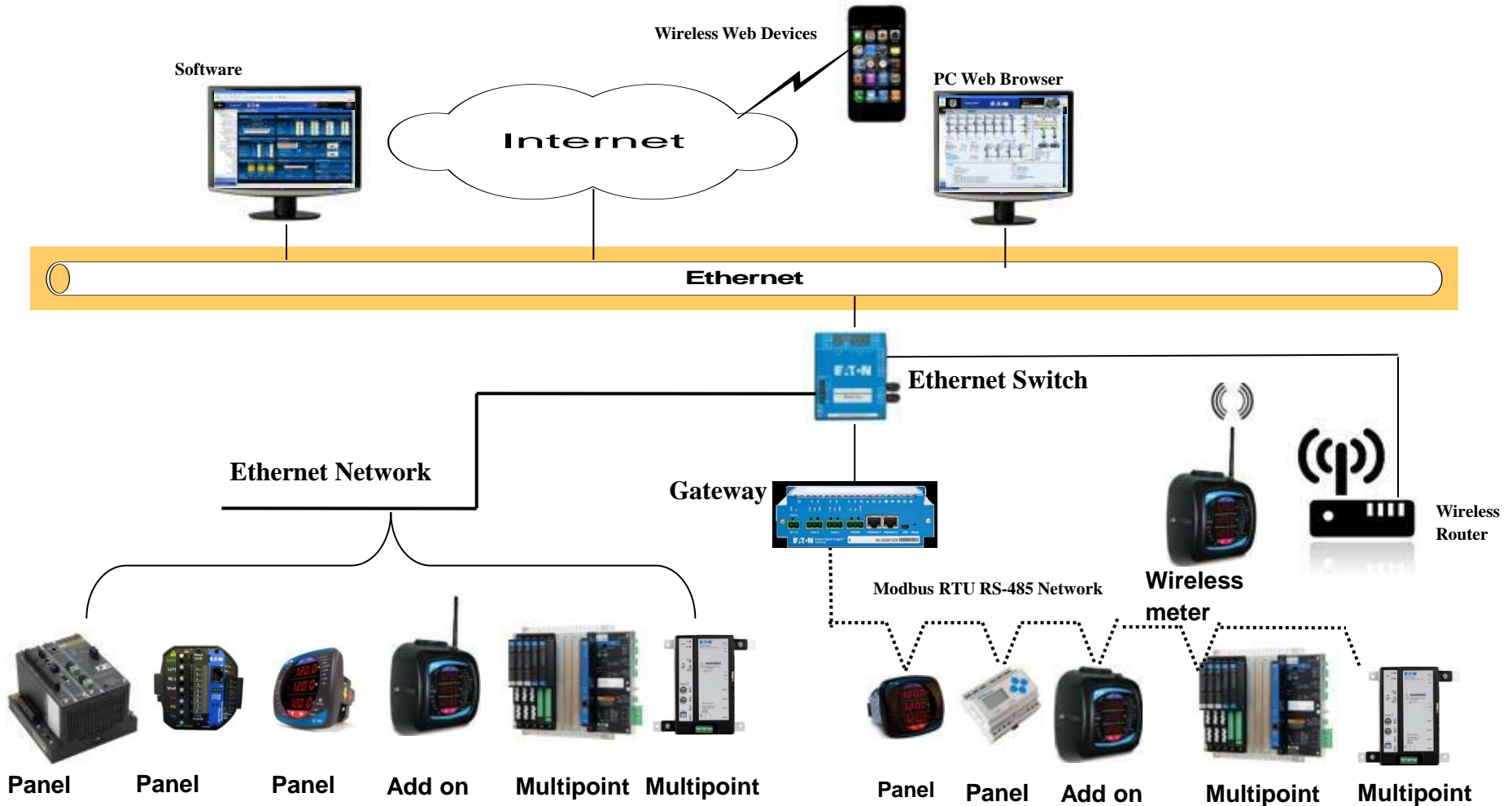
Characteristics

- NEMA 12, 3R, or 4X
- Single and multiple units
- Fused disconnect for line voltage
- Pre wired CT shorting blocks, CPT option
- Padlocking latch provision
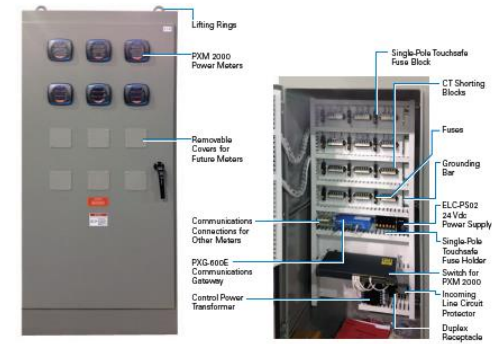
NEMA 1 16 Meter Enclosure with PXM 2000 Front View and Door Open
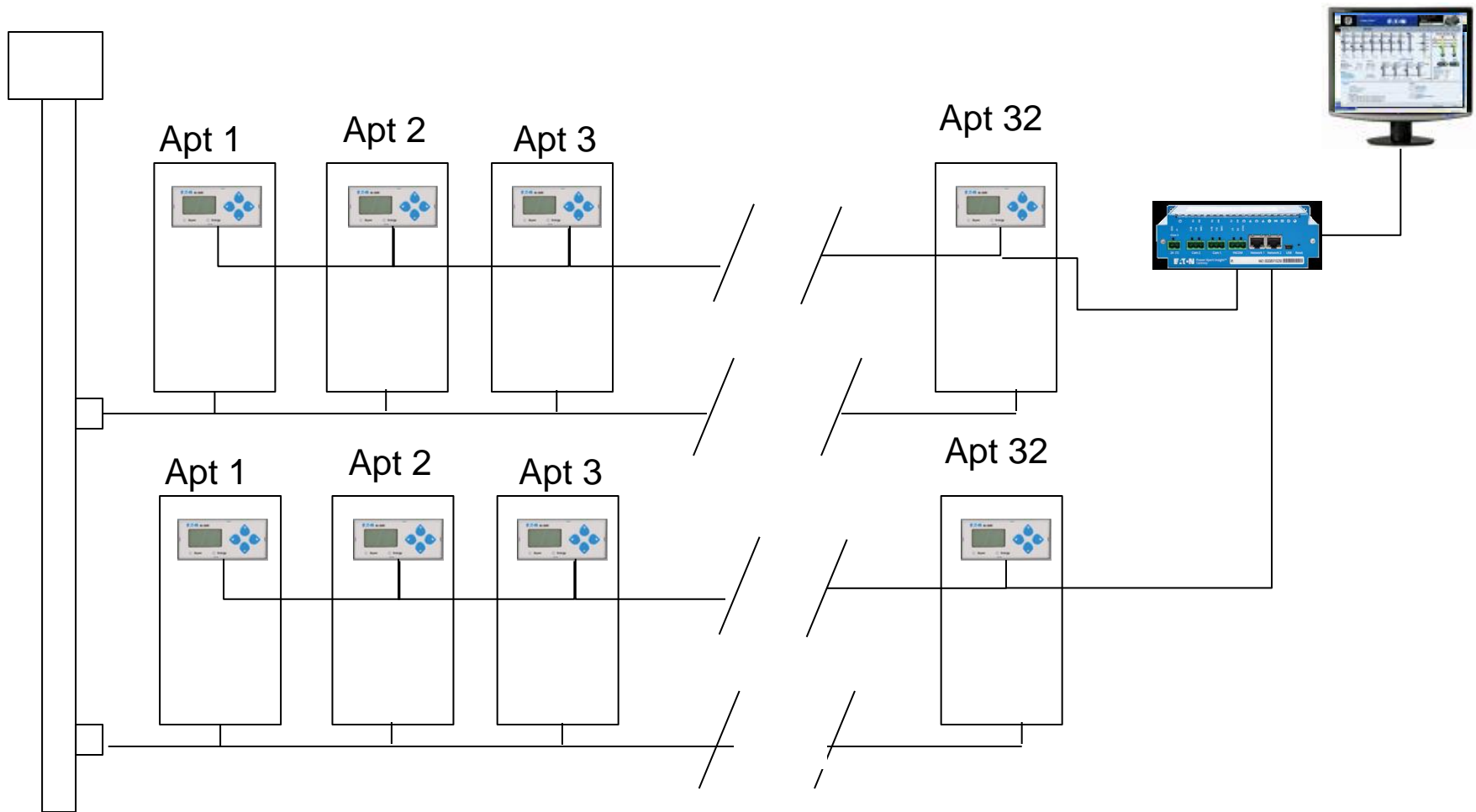
Communications Topology

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Meter Demo Sites

- PQ Meter
  - http://192.104.67.190/
  - user/user1
- PQ Meter
  - http://192.104.67.189/
  - user/user
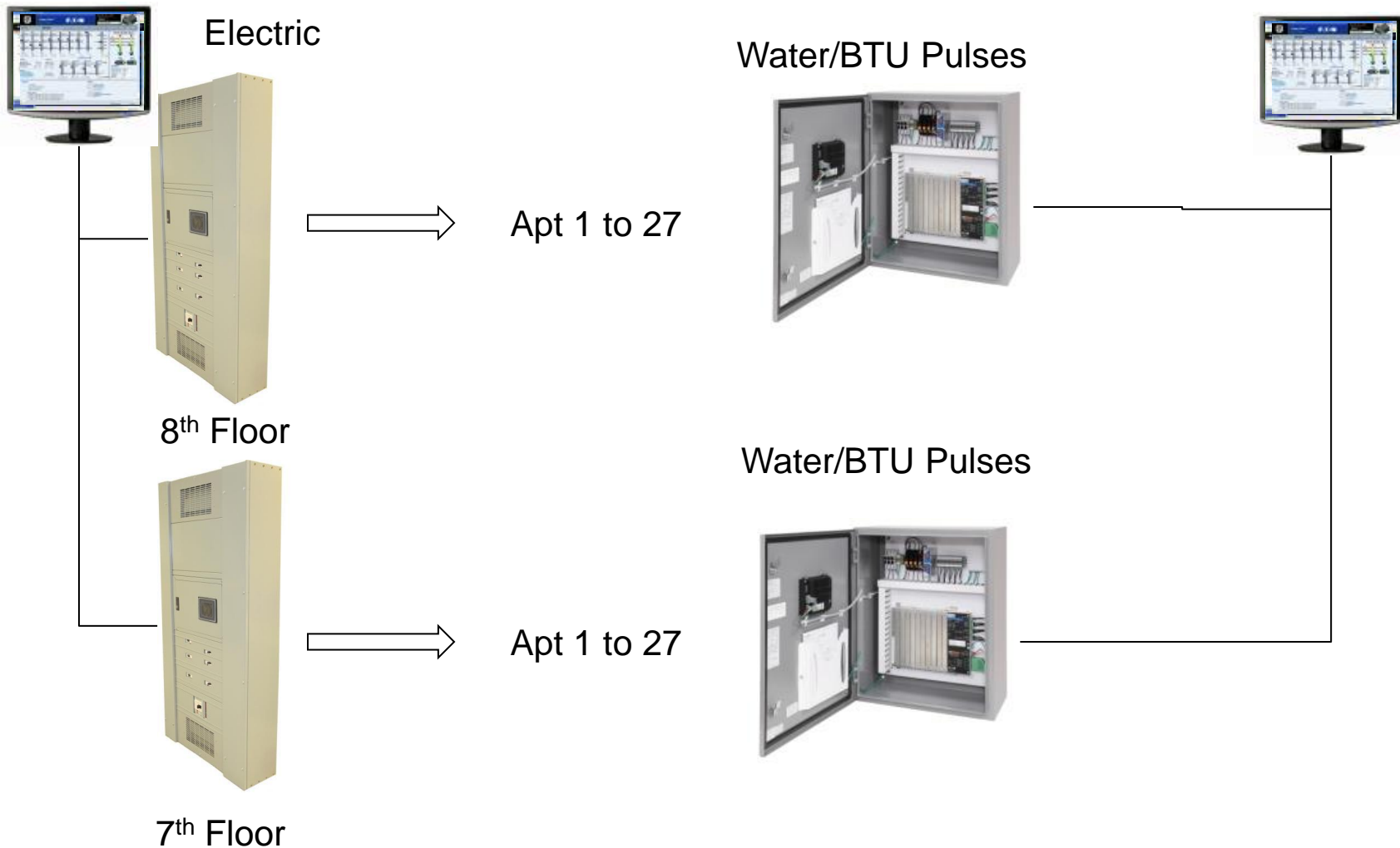- Multipoint Meter
  - http://192.104.67.164/
  - user/user

Project Examples

- Integrated Multiple Single Point Metering-Panelboards

- Integrated Multipoint Metering-Switchboard and Enclosed

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Integrated Multiple Single Point Metering-Panelboards

Apt 1   Apt 2   Apt 3   Apt 32

Apt 1   Apt 2   Apt 3   Apt 32

Integrated Multipoint Metering-Switchboard and Enclosed

Electric

Water/BTU Pulses

→ Apt 1 to 27

8th Floor

Water/BTU Pulses

→ Apt 1 to 27

7th Floor

Questions?