



## TI France Innovation Day

# Plug into the Smart Grid !

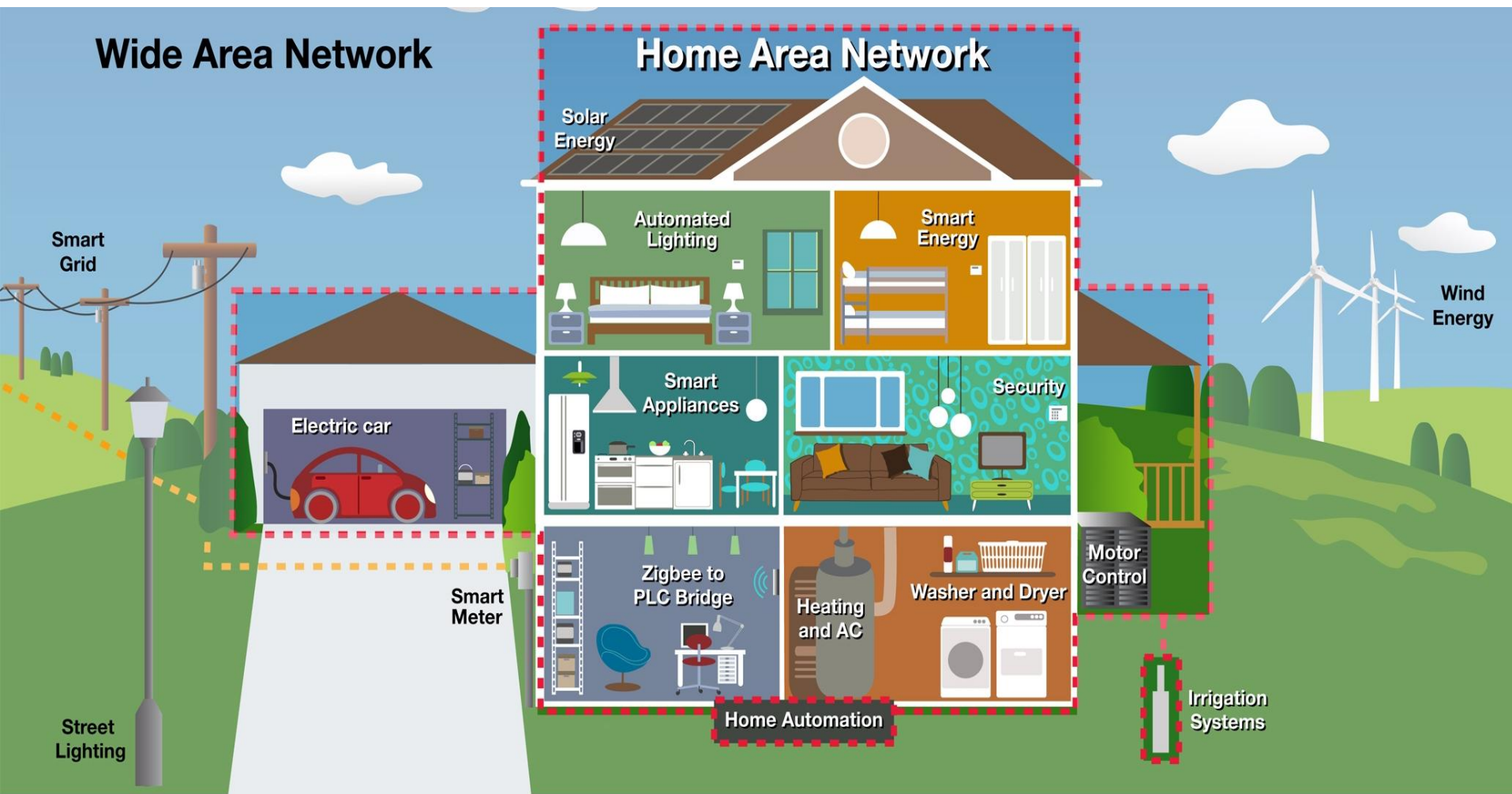
Emmanuel Sambuis

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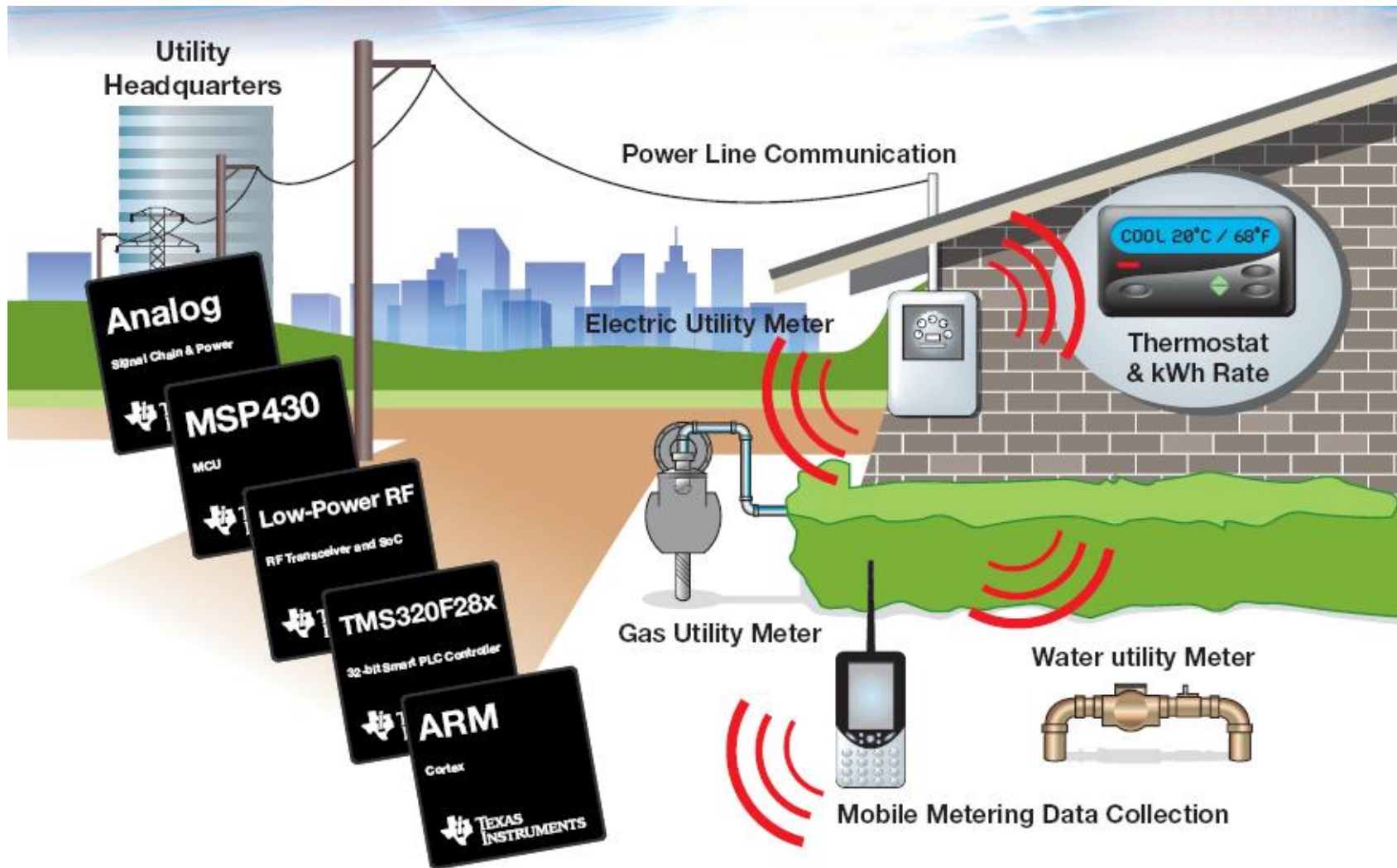
# Agenda

- What is the Smart Grid ?
- WW perspective
- From Smart Grid to Smart Metering
- Smart Electric Meters
- Smart Grid Infrastructure
- Smart Applications
- Open Discussion

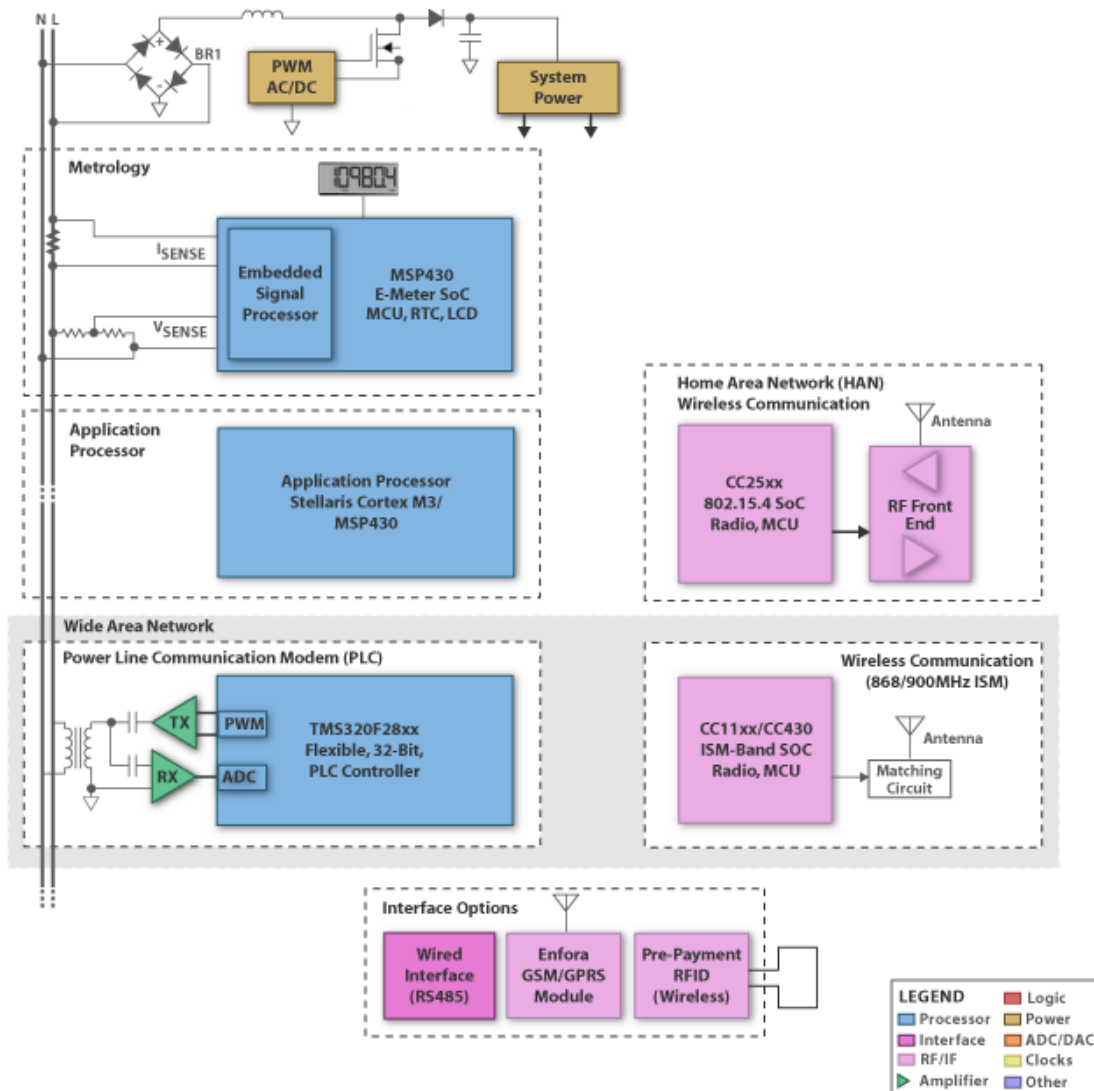
# Smart Grid to the Home



# From Smart Grid to Smart Meters

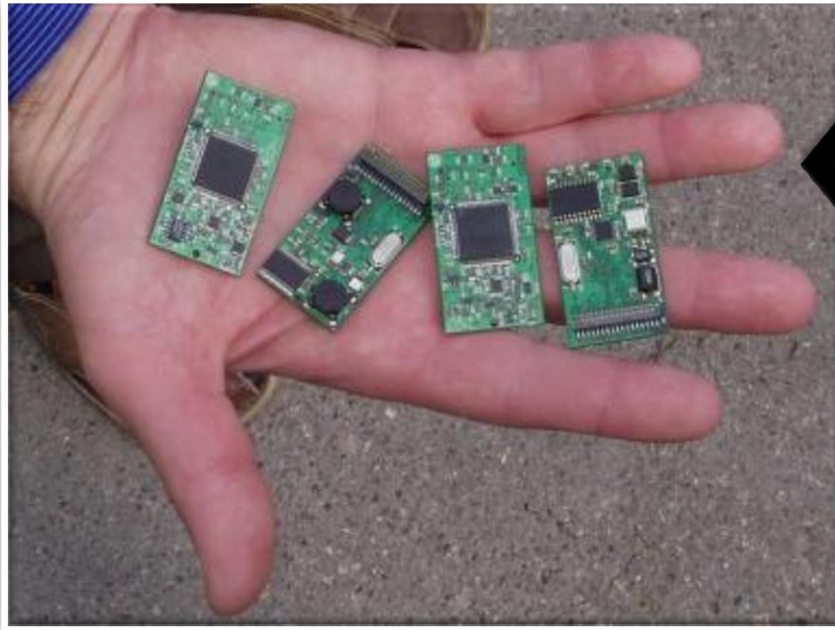


# Smart Electricity Meter





# Smart Grid Infrastructure



Samples of OFDM Power Line Modems for Smart Meters and Concentrators

Low-Voltage / Medium-voltage transformer in TI lab for system evaluation



# In Home Displays

Complexity/functionality ↑

## RF Module: RF SoC

### Need for Operating System

Sitara ARM9 AM1808 + RF Module\*  
+ Other options

- LCD controller integrated
- Graphics libraries
- Need for O/S (Linux..)



## Medium-End IHD

Stellaris Cortex M3 + RF Module\*

- Various LCDs, QVGA (I2C, I/O)
- Graphics libraries
- More options



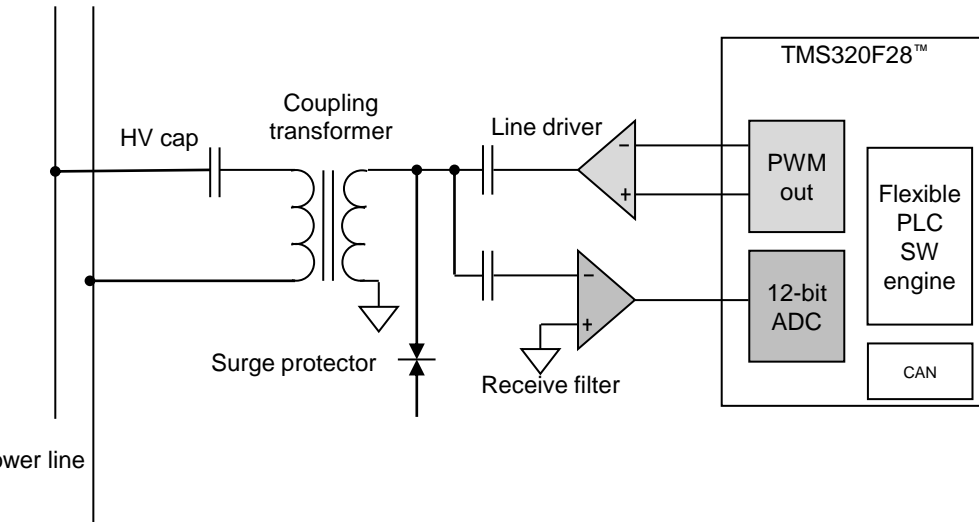
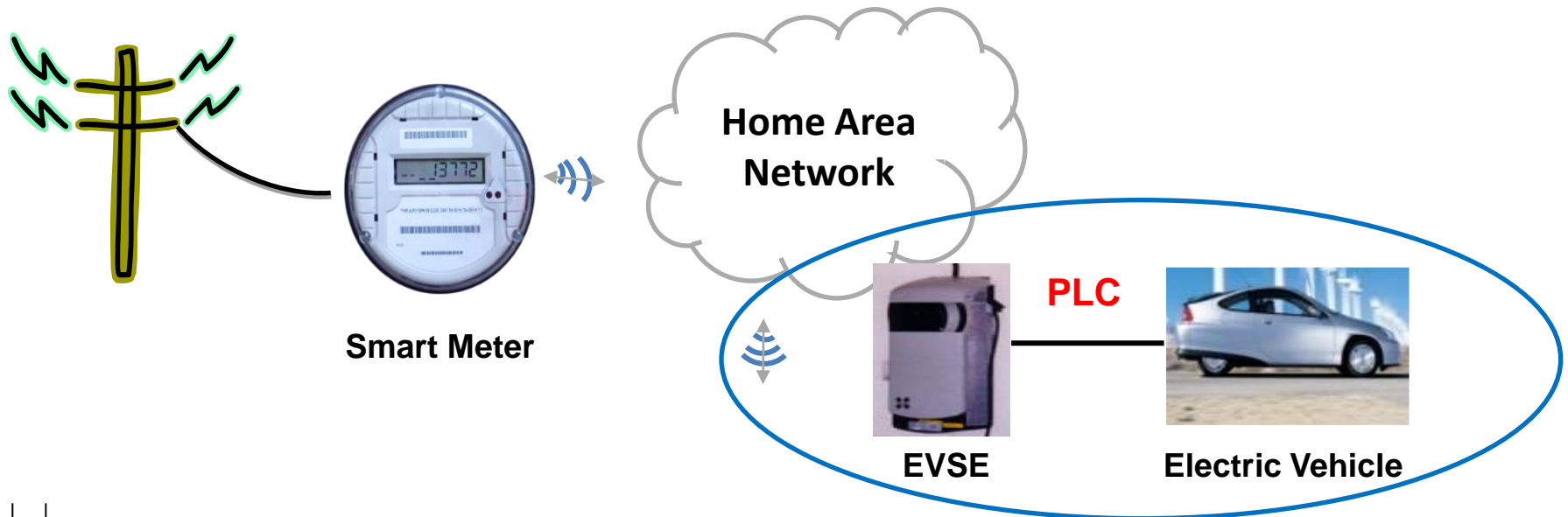
## Low-cost IHD

Single MSP430 + RF or  
MSP430 + RF SoC

- Zero Power Display
- Segment LCD display driver, buttons
- Simple user interface

MCU/uProcessor Options →

# Electric Vehicles



**Narrowband Domain**





# Smart Applications



Multi-Function display changes color to show energy cost at a glance.



**In Home Displays**



**Utilities Meters (electric, gas, water)**



**Heat Cost Allocator**



**Thermostats**



**HAN Gateway Communication Modules**

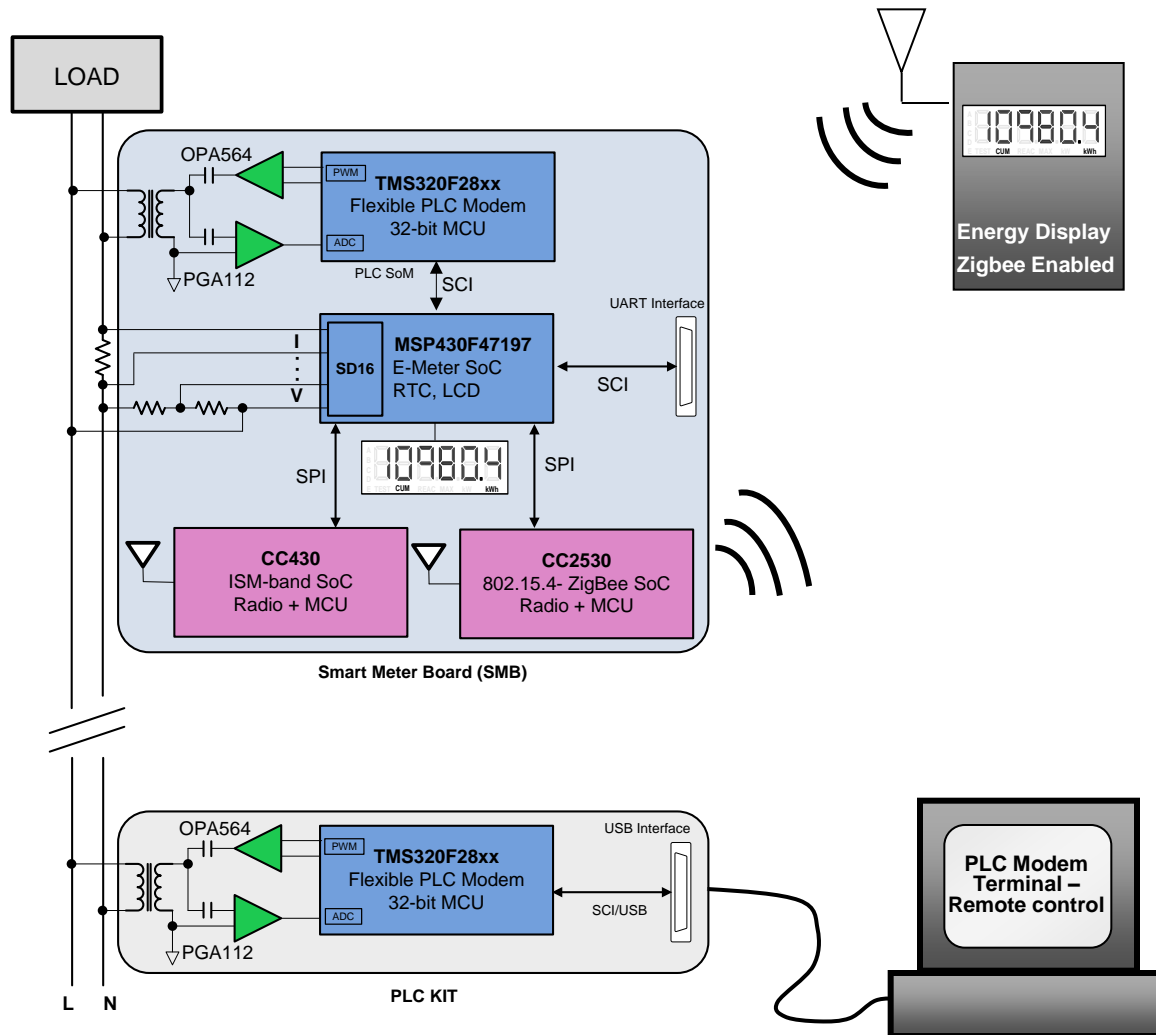


**RF Sensors**



**Smart Plugs**

# TI Smart Demonstration System



## From the meter to the outside world

- MSP430™ measures energy
- Measurement information sent to wireless display via the CC2530
- Measurement information sent to remote PLC modem terminal via power line with the 32-bit F28x MCU

## From the outside world to the meter

- New configuration set-up sent to the meter via power-line (new tariff profile, new parameter ...)
- Impact on measurement and visible change displayed on energy display

## Future steps

- Sub-1Ghz communication with 900-MHz CC430 options
- Load demand response

<http://e2e.ti.com/media/p/51825.aspx>



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**Thank-you!**

<http://www.ti.com/metering>