

Microchip Technology's Reference Implementation for Google PowerMeter

Presented by:
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Home Appliance Solutions Group



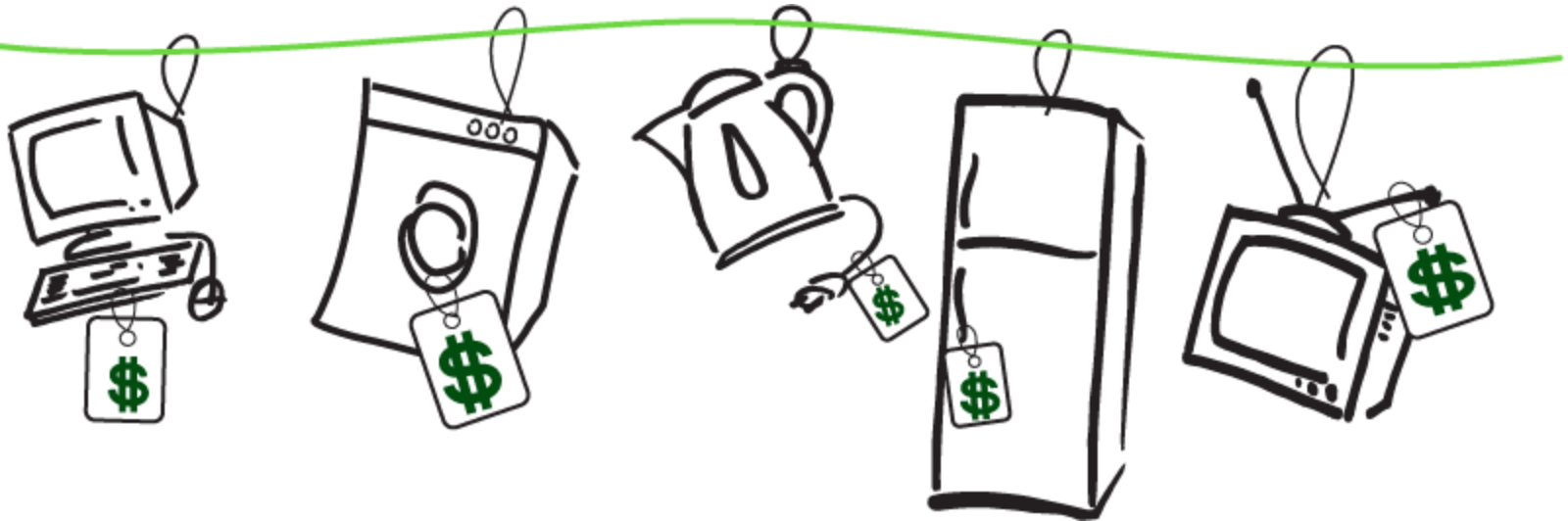
Reducing Energy Consumption

**Consumers, Governments &
Utilities want ...**

- **To reduce the amount of energy used today**
- **To become smarter with our energy usage**

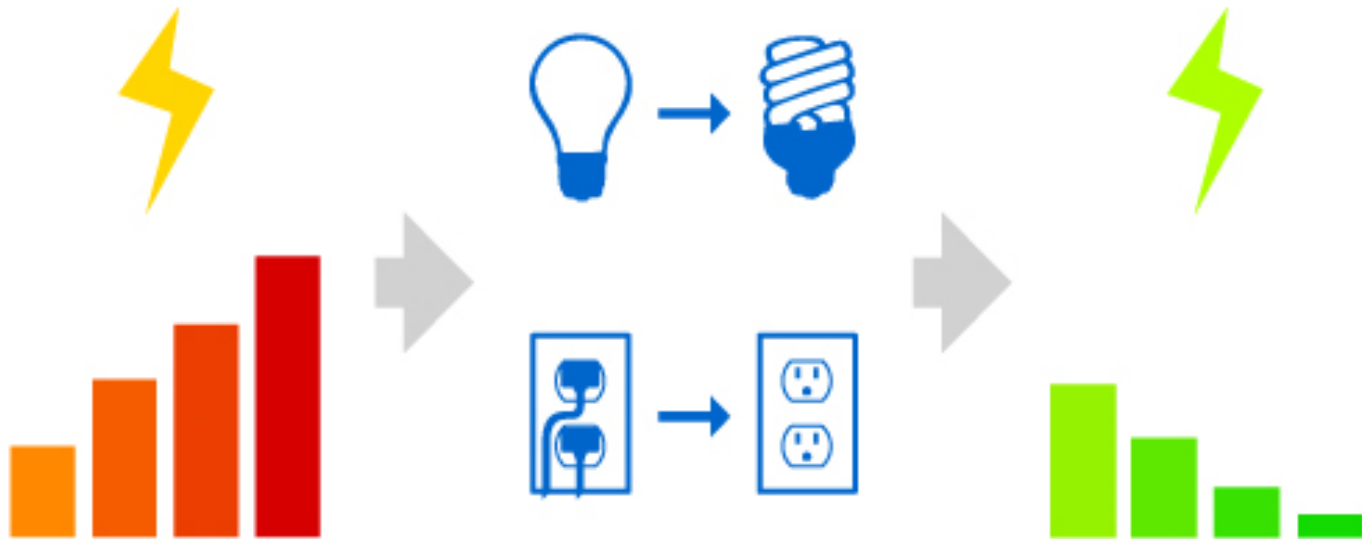


As consumers better understand the sources of their energy utilization, they are able to modify their behaviors in their energy consumption.



Google PowerMeter

A free, online, energy-monitoring tool that helps consumers save energy and money.



Track your energy.

Use less.

Save energy & money.

Google PowerMeter

Through the purchase of energy-management devices, consumers can accurately monitor & control of their energy usage.



Google PowerMeter

Track energy over time

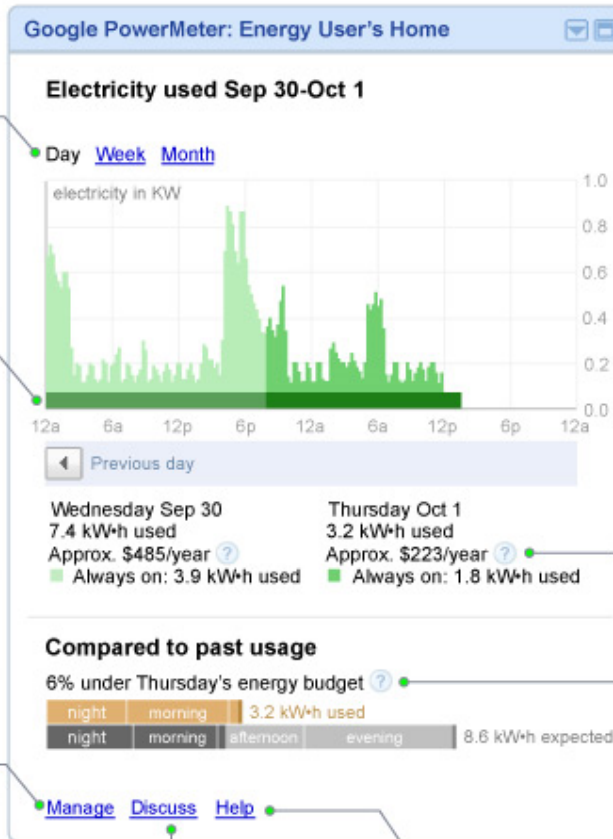
See how much energy you have used by the day, week or month.

Always on power

The darker shaded portion of the graph shows power that is always on, such as any appliance that goes on standby mode. Many appliances are always on; you just don't know it. Discovering these is one of the easiest and fastest ways to reduce energy use and save money.

Customize your experience

Add your estimated cost per kWh, sign up for weekly emails, and share your usage with family and friends.



Predict your costs

Google PowerMeter helps you to predict your annual energy bill so that you can start making changes and saving early.

Budget Tracker

Set an energy savings goal for yourself and track your progress.

Join the community

Get tips on how to save from other Google PowerMeter users and share what has worked for you.

Have a question?

Learn more about Google PowerMeter from our online help center.

Google PowerMeter

In the future, loads within the home will be capable of sending this information directly to Google.



Google/Microchip Partnership

Google powermeter

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Current Partners

See our current utility partners, energy monitoring device maker partners, and channel partners from around the world.



Utilities



Featured Devices



Channel

Itron

[Learn more](#)

Microchip

[Learn more](#)

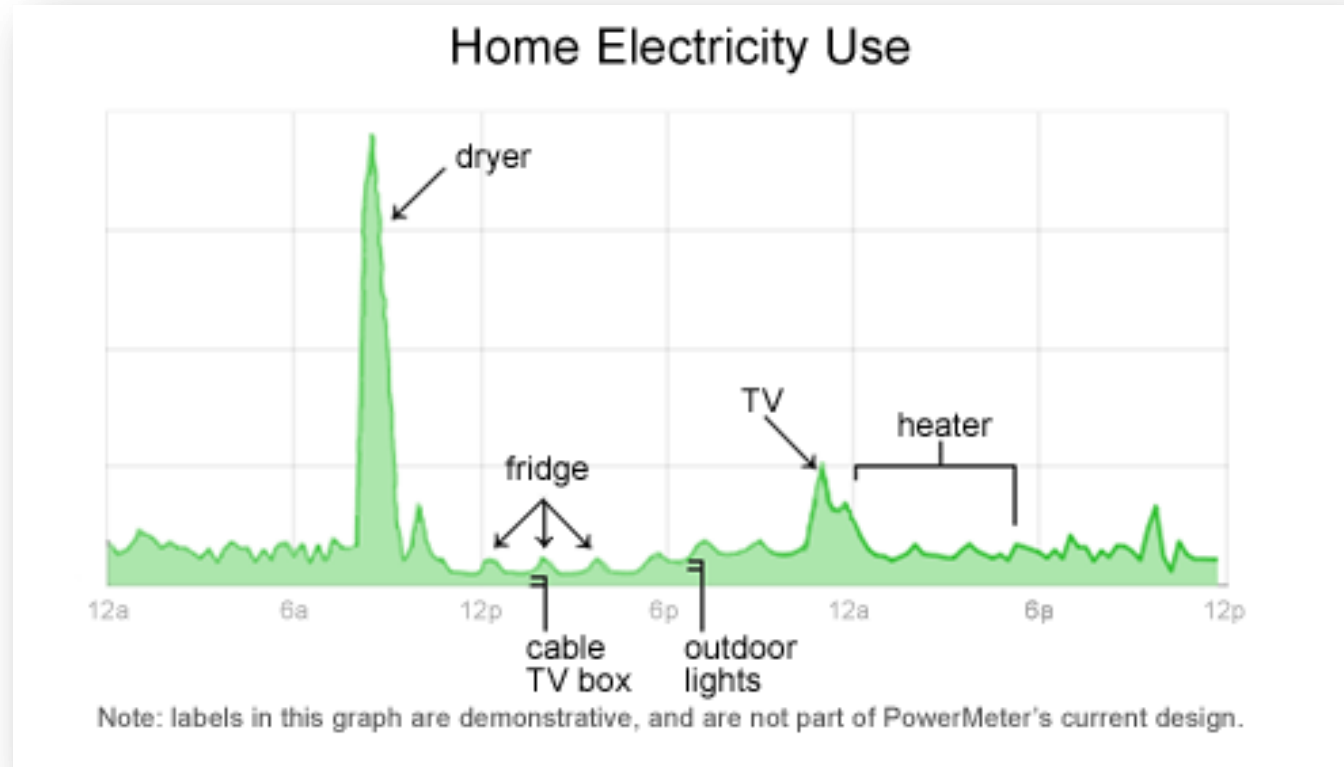
National Information
Solutions Cooperative

NISC

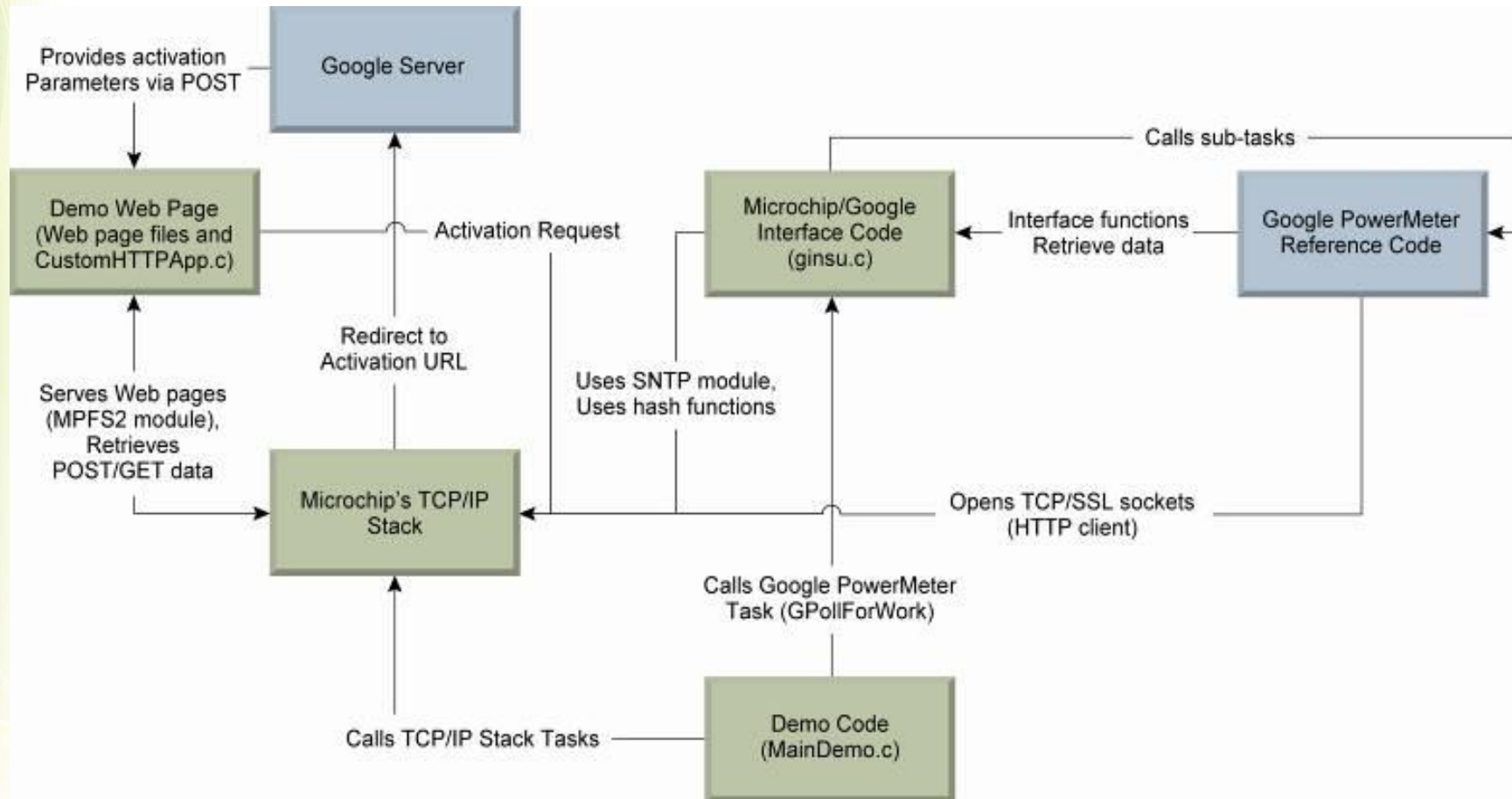
[Learn more](#)

Google PowerMeter API

- Allows device manufacturers to build home-energy monitoring devices that work with Google PowerMeter



Microchip Reference Implementation Software Block Diagram



Google PowerMeter API

- GPM Software Available at <http://www.microchip.com/GooglePowerMeter>
- Development Tools from Microchip
 - Microchip Explorer 16 Development Board
 - Ethernet, Wi-Fi[®] or IEEE 802.15.4[™] daughter boards

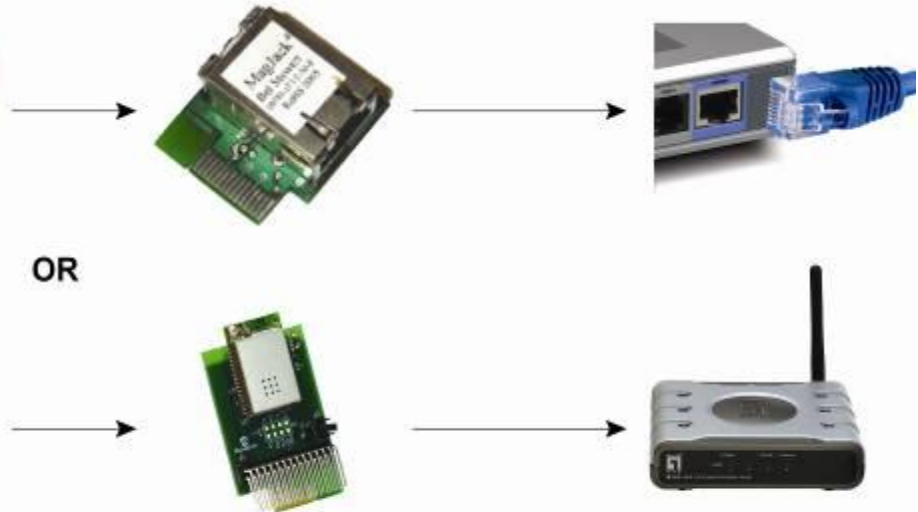


Microchip Reference Implementation Development Boards

- Explorer 16 + Ethernet or Wi-Fi® PICtail™ Daughter Board

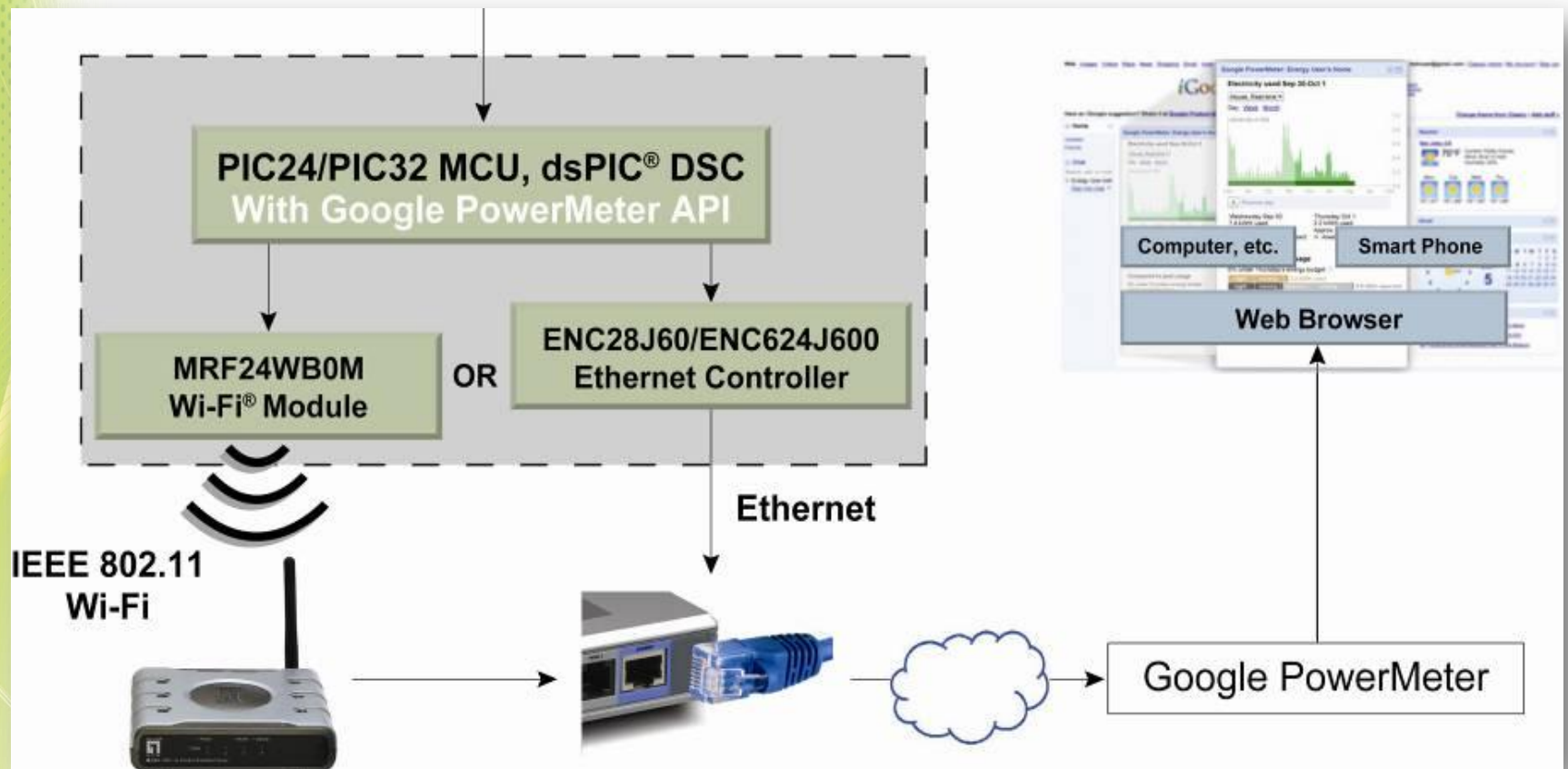


Explorer 16
Development Board

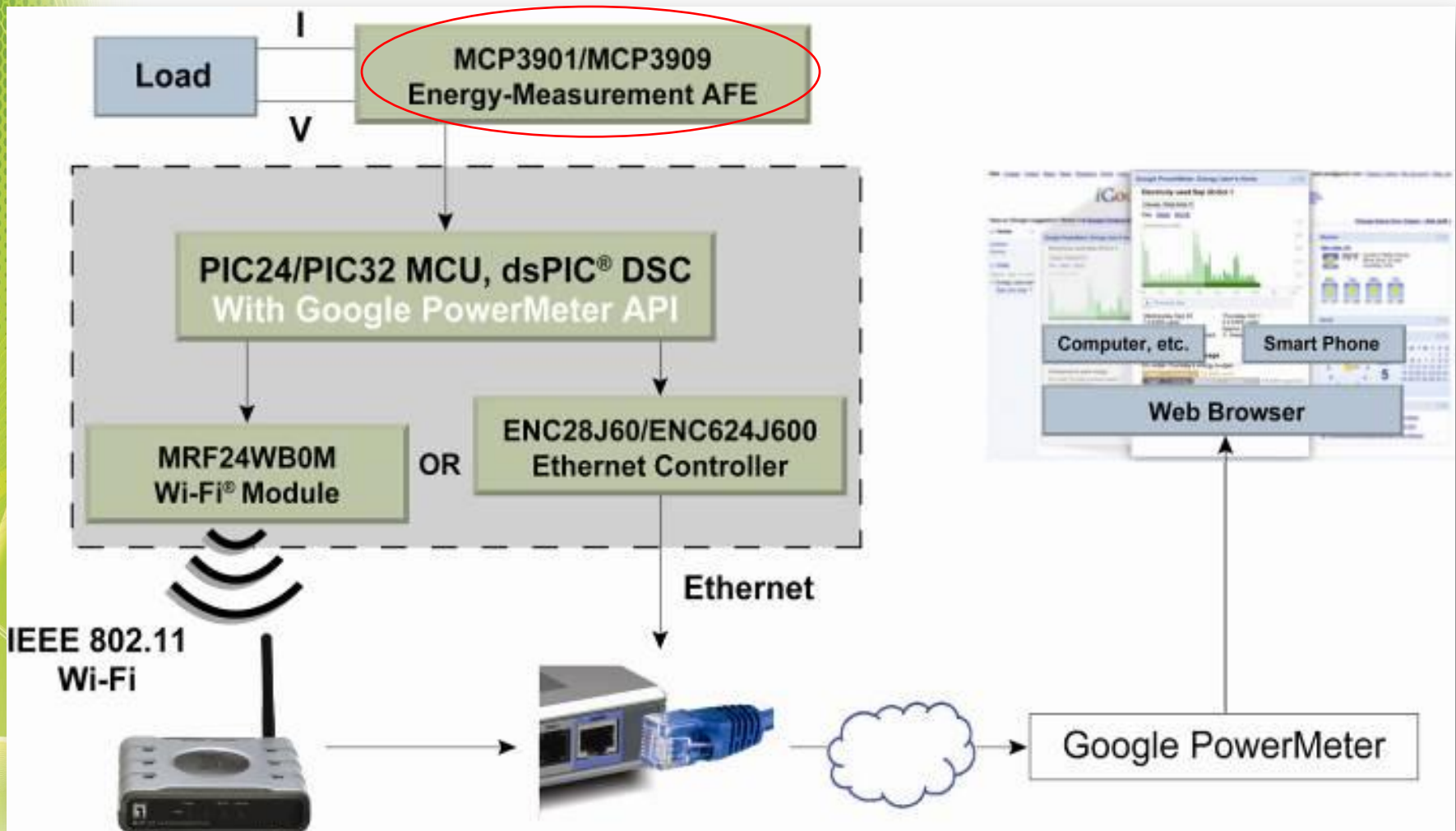


Ethernet or
Wi-Fi® PICtail™
Daughter Board

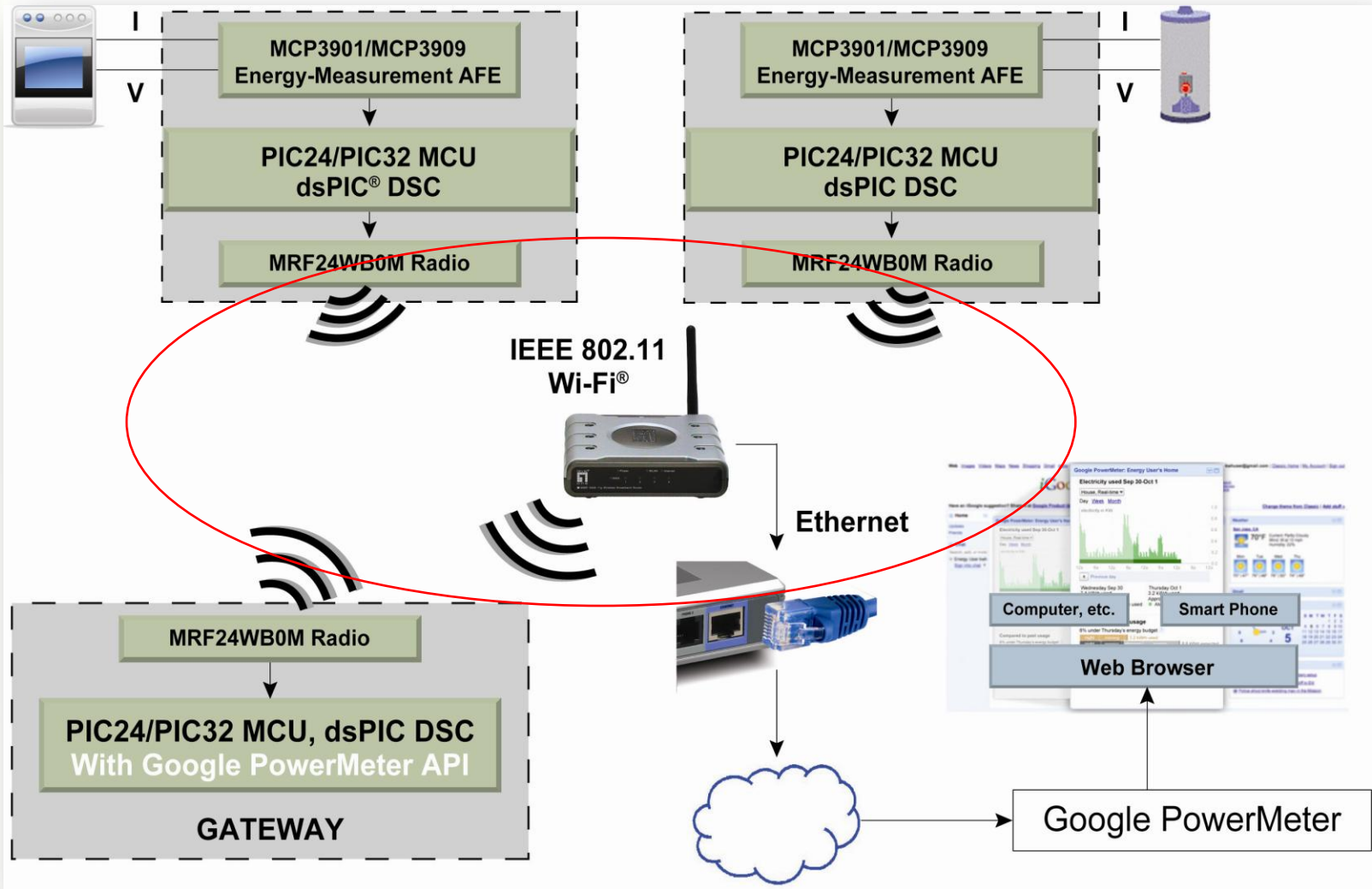
Microchip Reference Implementation Demo Block Diagram



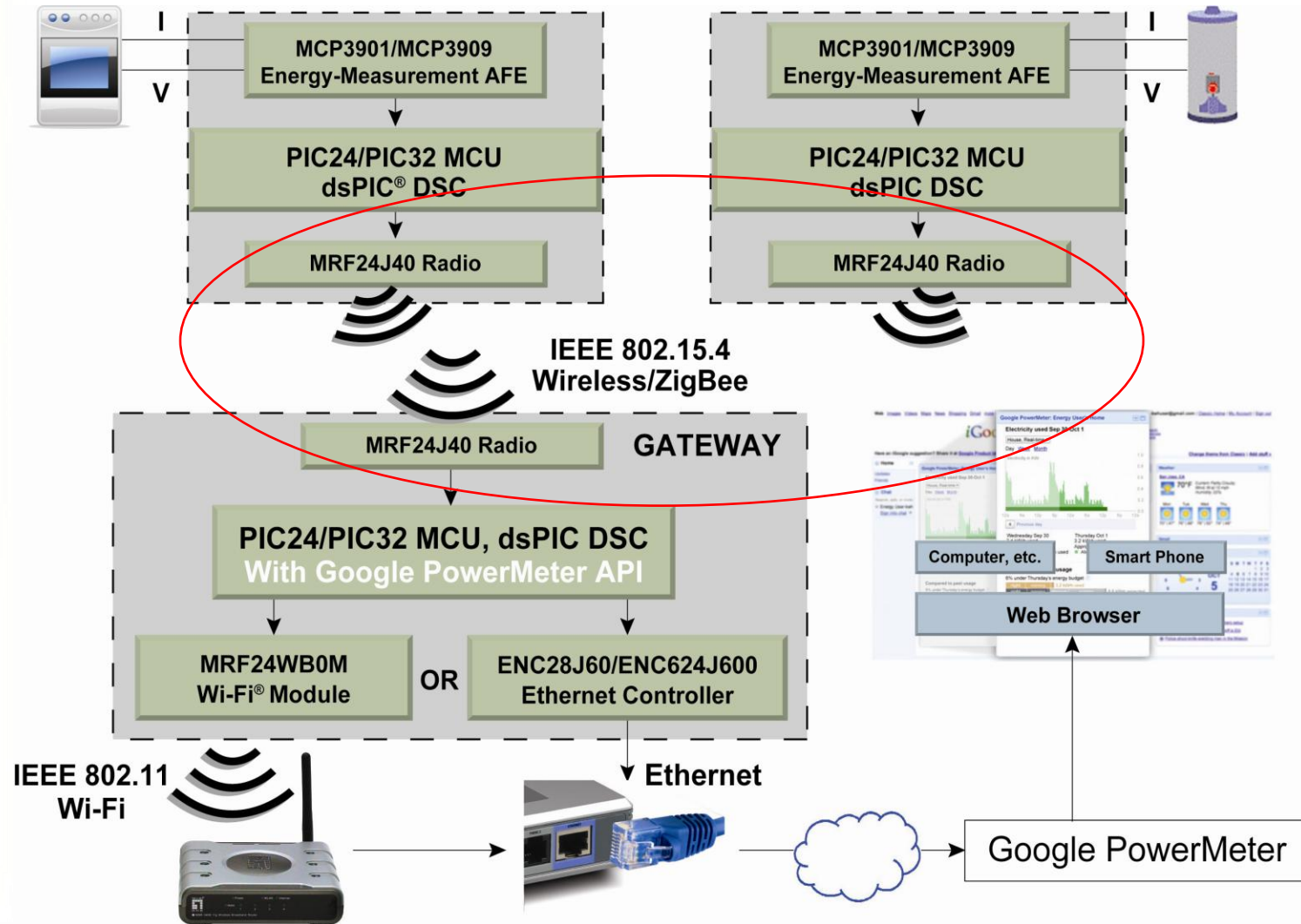
Energy-Monitoring Device



Wi-Fi® HAN Gateway

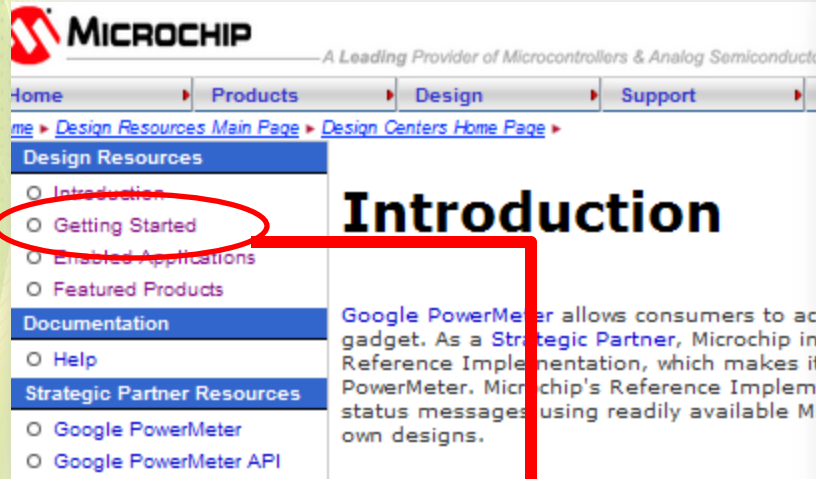


ZigBee[®] HAN Gateway



Getting Started

<http://www.microchip.com/GooglePowerMeter>



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Design Resources

- Introduction
- **Getting Started**
- Enabled Applications
- Featured Products

Documentation

- Help

Strategic Partner Resources

- Google PowerMeter
- Google PowerMeter API

Introduction

Google PowerMeter allows consumers to add a gadget. As a Strategic Partner, Microchip provides a Reference Implementation, which makes it easy to use PowerMeter. Microchip's Reference Implementation sends status messages using readily available Microchip designs.

Getting Started

You can get started with the following firmware and development tools. Please download the [Help file](#) for additional instructions.

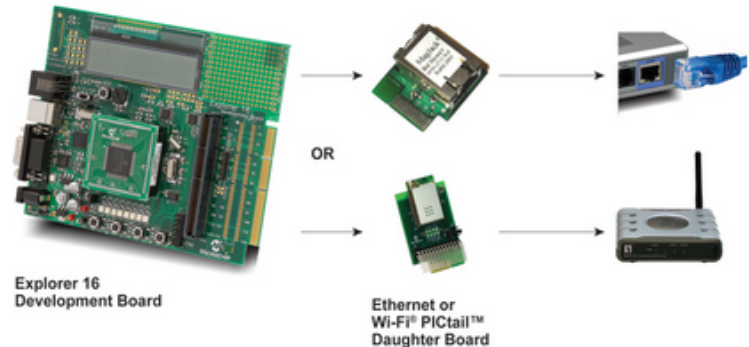
Firmware

You will need three firmware packages, installed in the following order, for this Reference Implementation:

1. Install the free [Microchip Application Libraries with the TCP/IP Stack v5.20](#) or later.
2. Install [Microchip's Data Encryption Libraries](#) (part number SW300052) for the SSL security layer to communicate with Google. The `ARC4.c`, `RC4.c`, and `RSA.c` cryptographic files in these libraries will replace the dummy versions found with the default TCP/IP Stack installation.
3. Install or copy the free [Reference Implementation code](#) to the directory that you installed the TCP/IP Stack to (Microchip Solutions by default). This will overwrite some default stack files.

Demonstration and Evaluation Boards

- [Explorer 16 Development Board](#) (Part Number: DM240001), which includes the PIC24FJ128GA010 and the dsPIC33FJ256GP710 Plug-In Modules (PIMs). For 32-bit Microcontroller demonstration, you can get the optional [PIC32MX USB PIM](#) (Part Number: MA320001) or [PIC32MX USB PIM](#) (Part Number: MA320002).
- One of the following [PICtail™ Plus™ Daughter Boards](#) for TCP/IP connectivity:
 - [Ethernet PICtail™ Plus Daughter Board for 10 Mbps](#) (Part Number: AC164123) or [Fast 100 Mbps Ethernet PICtail Plus Daughter Board](#) (Part Number: AC164132); or
 - [WiFi® PICtail Plus Daughter Board](#) (Part Number: AC164136-2).



Hardware Tools

[MPLAB ICD 3 In-Circuit Debugger](#) (Part Number: DV164035) is recommended for programming and debugging your designs. You can also use other hardware debuggers such as [PICkit™ 3 Debug Express](#) (Part Number: DV164131) and [MPLAB REAL ICE™ In-Circuit Emulator System](#) (Part Number: DV244005).

Software Tools

- [MPLAB® Integrated Development Environment \(IDE\)](#) (v8.43 or later) is an MS Windows® application that helps you write code that will run in an embedded application, and then enables you to test the application with various software and hardware components.
- For the WiFi® demonstration using the PIC24FJ128GA010 MCU, please use the standard [MPLAB C Compiler for PIC24 MCUs](#) (Part Number: SW006014), which allows for code optimization. For all other demonstrations, you can use the free [C Compiler in LITE mode](#) included in the MPLAB IDE.

Summary

Google PowerMeter is a free energy monitoring tool that allows consumers to monitor their energy consumption from anywhere online.

Microchip's Reference Implementation enables power monitoring and communication to Google.

Thank You



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