BUILT ON Power

Smart Grid Solutions Platforms

QorIQ P1025 Data Concentrator for Energy Management

Infrastructure solutions

Target Applicatons

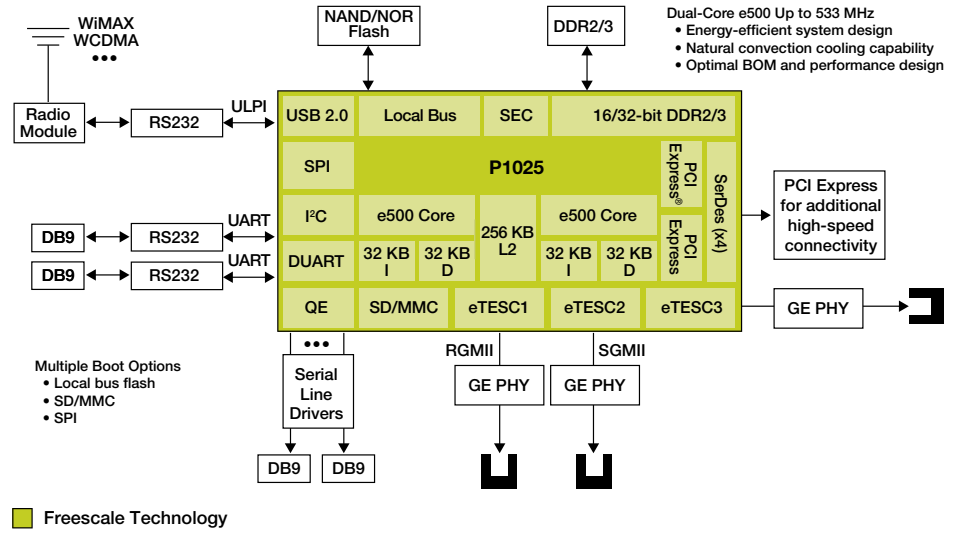
- Energy data collection/aggregation and management
- Secure data routing
- Packet time stamping

Overview

The Freescale QorIQ P1025 data concentrator reference design enables communication to smart grid meters within a neighborhood area network (NAN). The reference design is capable of a variety of usage models, including smart energy device discovery, communication protocols and uplink communication to the utility server. The QorIQ P1025 processor is based on Power Architecture® technology and delivers outstanding dual-core performance running up to 533 MHz, enabling a variety of complex usage models within a low power envelope that allows for fan-less designs.

The P1025 data concentrator reference design will instantly discover and connect with multiple smart energy meters. Enabled with an advanced metering infrastructure (AMI), the data concentrator allows for bi-directional real-time monitoring and control of multiple meters and transfers real-time information back to the utility server via a 3G uplink. The software protocol supports real-time demand response, allowing utilities to communicate with the meters and inject peak-load rate changes to influence load shedding.

P1025 Data Concentrator Application Diagram



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In the presence of a smart Home Area Networking (HAN) gateway inside the dwelling, the software can respond to real-time commands or recommendations encouraging smarter energy use, such as powering off EV chargers, washers, dryers or HVAC systems.

The data concentrator communicates with smart metering devices via the industry standard device language message specification or DLMS (IEC 62056). The widely used protocol consists of a “sign on” sequence, in which the smart meter unit and the data concentrator sign on and negotiate parameters such as maximum frame length (transmission and reception) or security settings.

Other protocols of communication between the data concentrator and the utility server are also implemented, including a 3G uplink. RF 900 (sub 1 GHz) and power line communication are planned to be implemented in the next design phase of the data concentrator.

Other features of the data concentrator include:

1. Detection and reporting of line breaks to the utility company
2. Alerting the utility company of smart meter tampering

The P1025 data concentrator reference design includes a complete suite of OpenWRT software that requires no license fees and supports the capabilities described above via a simple Web-based user interface. The data concentrator is based on a ruggedized, weather-resistant enclosure with internal antennas and power supply.

QorIQ P1025 Data Concentrator Specifications

Processor	• QorIQ P1025 dual-core 533 MHz processor
Connectivity and Functionality	• Serial line drivers for communication to power line communication controllers • 3G, WiMax or WCDMA communication via USB interface • 3 GB Ethernet capable ports to enable WAN/LAN communications • Capabilities for IEEE® 1588 time stamping and security acceleration • Encryption communication capability leveraging the device’s security accelerator
Memory	• Up to 128 MB of NOR/NAND flash memory • Capability to interface to DDR2/3 memory up to 800MHz data rate
Enclosure and design	• Energy efficient passive cooled design, natural convection capable • Ruggedized, weather resistant construction
Future development	• Power line communication interfacing and protocol development • RF900 sub 1 GHz

Features

- High-performance QorIQ P1025 dual-core device with up to 1300 DMIPS available to implement complex usage cases
- Discovers and interfaces to smart metering devices and implements DLMS protocol to standardize communication
- Collects, analyzes and transfers energy data to the utility server
- Detects broken links and tampering events
- Broadcast capability to the utility server using a 3G uplink card

To learn more, visit freescale.com/smartenergy

Document Number: P1025DATACONFS REV 0