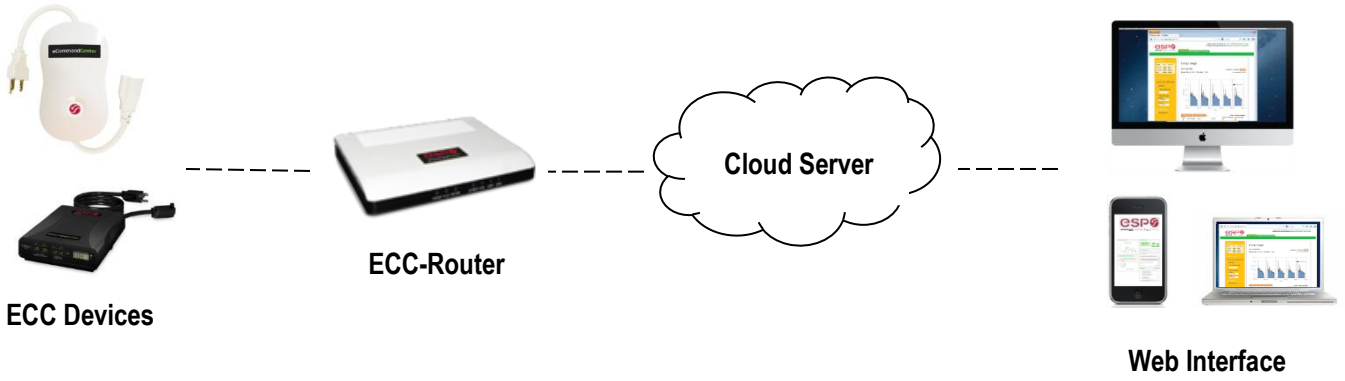
The ESP eCommandCenter energy management technology platform consists of four core components: (1) the eCommandCenter devices (ECC-Node and ECC-PCS), (2) the ECC-Router, (3) the cloud server, and (4) the web interface. There is two way data flow between (1) and (4).



Detailed description of core components

(1) **The eCommandCenter devices:** The basic function of the eCommandCenter devices is to monitor and control power consumption, with two way communication back to a ZigBee ECC-Router. There are two device configurations, the ECC-PCS and the ECC-Node. These devices (a) monitor power consumption using a meter-grade Cirrus Logic CS5467 chip, (b) control power consumption using energy-efficient latched relays, and (c) have two-way ZigBee communication at the 2.4 Ghz band utilizing a Freescale MC13224V radio. Power consumption is reported to the ZigBee ECC-Router at 1 Hz (1 reading per second).

When the ECC-Router is present, the eCommandCenter devices will (a) sync up with all commands stored on the client, (b) send data to the client if requested (i.e. the client needs to pull data from the eCommandCenter), and (c) sync the time on the eCommandCenter devices.

Importantly, if the ZigBee ECC-Router disappears, the eCommandCenter devices continue to function. The eCommandCenter features 4MB serial flash, a MCU, and a clock so that it is able to store data, process commands, and keep time even with frequent disconnections from the ECC-Router. This makes the eCommandCenter devices robust to any disruptions to the ZigBee network, power failures (critical for utility applications), and disruptions.

The presence of storage on the eCommandCenter devices allows you to set up a data “pull” system, which is critical for bandwidth management. This is described in greater detail below. Storage also allows for over-the-air upgrades of the firmware.

The firmware is based off of the ZigBee HA protocol. The electronics are an original design, and we do not use any additional modules for the wireless communications, hence making the design cost-effective and efficient. The device is certified by UL/cUL (916 as power monitoring equipment, 94 for fire safety, and 498a for current taps).

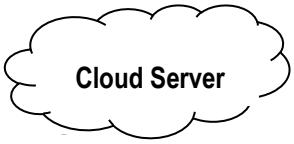
(2) **The ECC-Router:** The ECC-Router acts as a "pass through" device, enabling communication between the eCommandCenter ZigBee network and the cloud server. The ECC-Router has the footprint of a conventional router and serves as a bridge between ZigBee and TCP/IP.

In addition to ZigBee communication, the ECC-Router maintains two channels of TCP/IP communication. The first is communication with the cloud server, which is performed securely over https on port 443. All outbound push/pull requests are directed to the ECC cloud URL, so an ECC-Router sitting behind a corporate firewall can be restricted to talk to that URL exclusively for an additional layer of security.

The second channel of TCP/IP communication is between the ECC-Router and a user interface on a user's web browser, which exposes the functionality discussed in (4) below. Corporate networks hosting an ESP ECC-Router must ensure all relevant firewalls and proxy/content servers permit the software TCP access over ports 443 and 12346, as outlined above.

The eCommandCenter system communicates asynchronously with the cloud server and the eCommandCenter devices (via the ECC-Router). Each ECC device contains a buffer and local database instance that support two-way communication with the ECC-Router (which it then passes on to the cloud server). The ECC-Router initiates the communication with both the cloud server and each individual device. The ECC-Router manages the de-caching of data for each device on its network while maintaining the secure ZigBee network. It acts as an essential pass-through for data exchange of both energy data going to the cloud and for scheduling updates headed for a particular device. If the ECC-Router is not available for some reason, there is no data flow between the devices and the cloud server. The ECC-Router contains no storage of information.

(3) **The cloud server.** The cloud server architecture is standard, featuring a web server and a database. The web server handles requests from mobile devices, and also serves the web interface, which is how users primarily interact with the eCommandCenter devices. Through the web interface, the users are able to visualize information, control the eCommandCenter devices through schedules, and receive alerts. The database stores user information, power consumption data, and proprietary analyses of the data.



(4) **The Web interface:** The Web interface is responsible for two major tasks: (1) configuring and managing the devices and (2) coordinating the data flow with the cloud server and ECC-Router.

Device configuration involves two steps. First, each device must be paired with a ECC-Router, creating the ZigBee network. Second, each eCommandCenter device is paired to its specific ECC-Router through a secure key exchange process. Once completed, attributes such as a name, brand, device type, etc. are captured. This process requires web-based communication as all the data is securely stored in the ECC cloud.