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White Paper

Enfora Thought Leadership Series

Automatic Meter Reading and the Advanced Metering Infrastructure

Best Practices: Considerations in Wireless Design

Antenna

The link to the utility is an antenna at the meter, and that antenna can be mounted inside or outside the meter. Internal mounting provides greater resistance to fraud and vandalism but adds complexity to the overall radio-frequency (RF) design because every electronic element within the meter has the potential to interact with the antenna. In an AMI network that uses multiple wireless technologies (e.g., ZigBee to the concentrator, GPRS to the utility), those must be able to coexist.

To ensure simple installation and reduce time to market, most new smart-metering devices are being manufactured with a built-in antenna. These antenna designs are typically made as slim PCBs, which are designed into or attached internally to the plastic meter housing. However, due to installations in rugged areas or in metal meter housings, there is still a need for optional external antenna mounting. The antenna connection, typically SMA-based, should also be placed outside the shielded area in order to avoid installer interference with the meter shielding or housing.

Overall, the most effective approach is to design in a special antenna switch that can auto sense the best-available signal and select the antenna solution that best fits the environment.

SIM

In designs that utilize a wireless technology that requires a SIM card (e.g., GPRS), placement of the card is another important consideration. Today, the two most common approaches are remote and on-board placement. Looking to the future, the software-based "embedded SIM" approach is likely to become the favored model as announced devices come to market. The choice of SIM card implementation can also have an impact on manufacturability due to factors such as increased device complexity and greater manual labor content, which leads to higher costs. The "right" answer depends on the situation so it is best to have options that span remote, on-board and, in the future, embedded implementations.

Power Supply

Even though smart-metering units draw power from the utility's own network, the cost becomes critical in large-scale deployments. One cost-saving solution is communication devices capable of powering down (or sleeping) when not in use. Leveraging a low-power design should increase component life and reduce the load on the existing power infrastructure. Additionally, leveraging a low-power architecture, with long-life battery backup, can provide seamless and uninterrupted communication and control during a power interruption or outage.