Application Note

AC91007-01

Field-Installable Universal External Smart Meter Antenna Extender

In the smart energy market there is an increasing need for improved read rates for millions of deployed smart utility meters that are remotely connected to the internet. These end points connect via public LTE, private spectrum LTE — such as Anterix™ 900 MHz spectrum — 2.4 GHz ISM, 900 MHz ISM mesh and other wireless networks and technologies.

The need for improved read rates is largely driven by equipment vendor contractual penalty assessments for less than 100% read rates. Additionally, grid-edge processing of critical data analytics on energy consumption inside the smart meter is growing, necessitating reliable connectivity to ensure a comprehensive data set for operation.

Avoiding Costly Densification

Smart meter connectivity, and therefore, read rates, can be affected by many factors including physical interference and technical issues — such as cross-polarization between meter antenna and base station antenna. However, deploying more base stations (densification) is a costly method to improve connectivity.

Instead, improved meter read rates can be achieved for less cost by using higher-efficiency, external antennas internally coupled ("under the glass") to the smart meter, or via an external "fix-up" antenna mounted on the meter and coupling through the glass to the internal meter antenna.

Under-the-Glass External Antenna with RF Coupler/Isolator

The external antenna with internal RF coupler solution, depicted in Figure 1, increases wireless range and boosts connectivity to distant base stations.

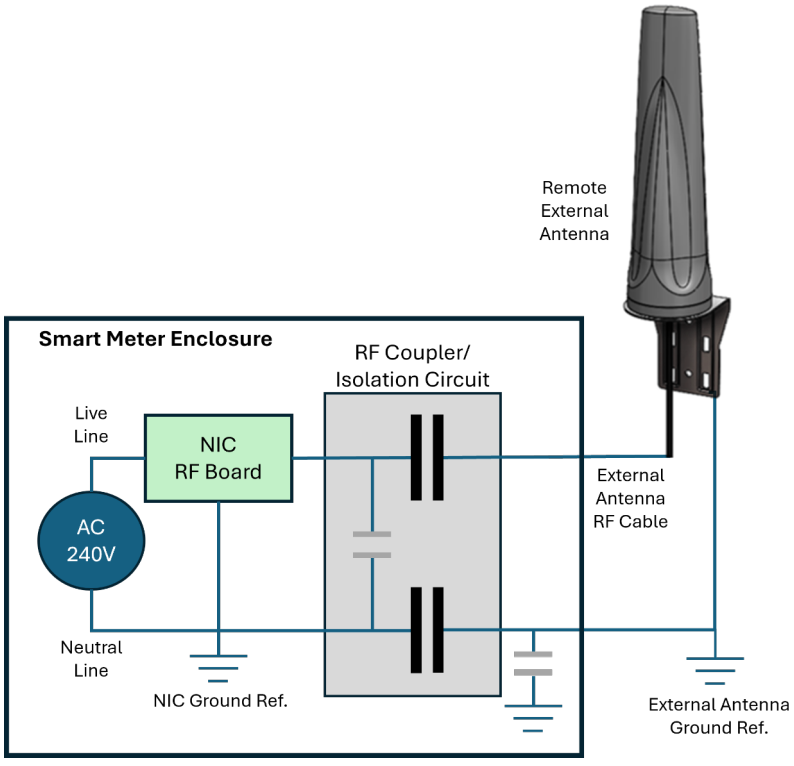

Figure 1. Smart Meter Schematic Showing Use Case for AC20424-01MM RF Coupler

This solution is highly efficient, having less than 1dB insertion loss, but requires installation within a smart meter by a knowledgeable meter shop to ensure safe electrical isolation of the remote antenna from the high voltage power supply within the meter. This isolation is achieved using a low RF insertion loss high electrical isolation (10KV typ.) RF coupler/isolation circuit, as shown in Figure 1. The Antenna Company provides patented RF coupler solutions for such implementations, including the AC20424-01MM and AC20425-01UU.

Field-Installable Fix-Up Antenna Solution

A “fix-up” antenna is a low-cost, universal, field-applied solution to increase smart meter read rates. This solution has lower performance than an RF coupler solution — with typical -6dB @900 MHz RF coupling loss (excluding cable losses) — but it is field installable to the outside of a smart utility meter and does not require access to the inside of the meter or removal of the meter from the customer premise. In many areas where smart meters are in basements or in an area without good wireless reception, a "fix-up" antenna solution can be a viable way to quickly get the smart meter back on the network. The Antenna Company provides a "fix-up" antenna kit, part number, AC91007-01.

Figure 2. External Fix-Up Antenna installed on Smart Meter.

AC91007-01 Fix-Up Kit

The AC91007-01 Field Installable Universal External Antenna Extender Kit provides everything needed to quickly retrofit smart meters in the field. Included are a self-adhesive fix-up antenna which adheres to the outside of the smart meter, a 10-inch zip tie to securely fasten the fix-up antenna, and a high-gain external antenna (AC94541-01NA) with mounting accessories. An N-type plug to N-type plug cable used to connect the AC94541-01NA antenna to the fix-up antenna is not supplied because of the variability of installation scenarios. Contact The Antenna Company for cable options.

The AC91007-01 Field-Installable Universal External Antenna Extender Kit supports cellular, ISM and LPWA frequencies from 698 MHz to 2700 MHz, including support for Cat-1/Cat-M1/ Cat-4 LTE cellular, 900 MHz ISM and Private LTE, and 2.4 GHz WiFi.

The kit is compatible with many types of residential and commercial & industrial (C&I) ANSI and IEC form-factor smart utility meters that contain an internal antenna and under-the-glass wireless modem on the network interface card (NIC).

Fix-Up Antenna Installation

Smart meters often have an internal antenna mounted such that it is visible through the cover. The position of this visible antenna may be used as a guide for placement of the fix-up antenna. Align the fix-up antenna with the internal antenna as closely as possible. If receive sensitivity (RSSI) measurement equipment is available, the RSSI may be measured as the fix up antenna is positioned until the optimal placement is achieved. The RSSI technique may be used with smart meters having visible or hidden internal antennas.

See The Antenna Company video demonstration of the Field Installable Universal Antenna Kit at https://youtu.be/6PecpsA5p_o.

For further information or assistance integrating into your device, please contact sales@antennacompany.com

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