

SEMI-AUTOMATIC WIRELESS METER (RTU) READING



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Introduction

As wireless technologies continue to evolve new alternatives become available to improve on productivity and worker safety.

Problem Statement

Provide a more efficient and safer method of accessing data from within a SCADA system.

Previous Options

Existing methods involve physical connection between a laptop computer and RTU. This connection requires personnel to be potentially exposed to adverse weather conditions and possible hazardous environments.

Wireless Meter Reading

Applies short range, low cost wireless technology to provide a wireless link between the RTU and laptop computer.

Benefit 1

The time required to log the data from the RTU is reduced as the site inspector can establish the connection to the RTU from the vehicle used to make the site visit.

Benefit 2

The site inspector can remain in the safety of their vehicle minimizing any risks involved with the inspector entering a hazardous location area.

Benefit 3

Exposure to inclement weather can be minimized.

Implementation

SCADA (Supervisory Control and Data Acquisition) systems usually contain RTU's (Remote Telemetry Units). An RTU monitors digital and analog parameters of a specific piece of equipment (i.e., pump, storage tank). The RTU controls the equipment and can provide a mechanism for storing data and interfacing with a Central Station via a communication link (i.e., serial RS232 port).

The communication link between an RTU and a Central Station can be established by a variety of technologies. Wireless technology provides a flexible means of providing this connection. The full time wireless link normally utilizes cellular, satellite or private RF wireless technologies which can add significant cost, both in hardware and data access plans. In some cases it is not feasible or economical to provide a full time wireless link from a PLC to a Central Station. In addition many systems require regular on-site supervision and in those cases, site visits by inspectors/personnel are a scheduled regular occurrence. In the scenario where a site visit is required the collection of RTU data may be performed manually. The physical hookup to an RTU during a site visit may be a time consuming small part of the overall site inspection. Using a short range wireless technology to take over this task can free the site inspector for more important tasks.

When a laptop is used to connect to an RTU a custom application running on the laptop is used to access and log the RTU data. When a laptop connects to an RTU the laptop sends a message telling the RTU it is ready for a data upload.

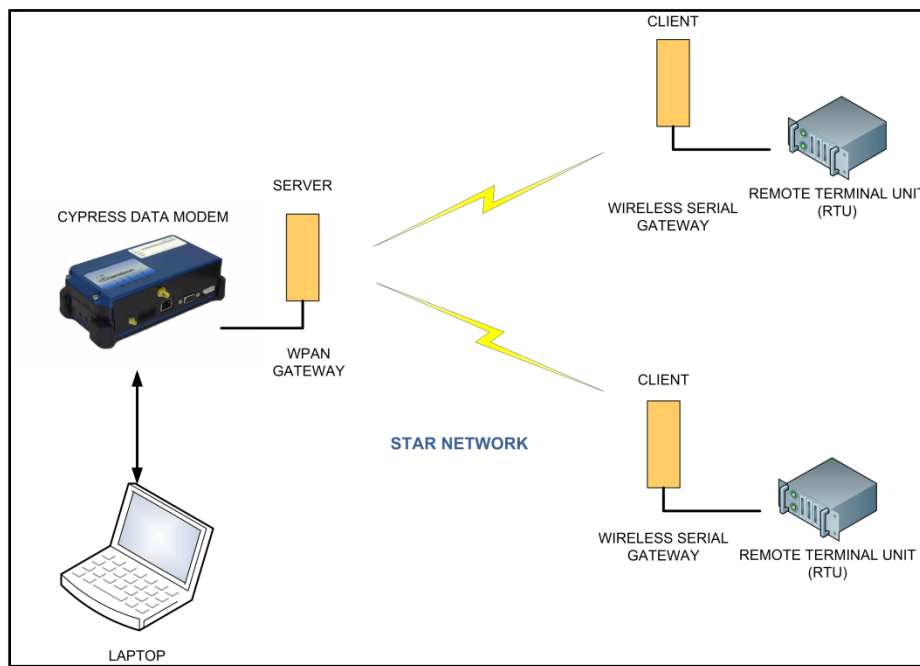
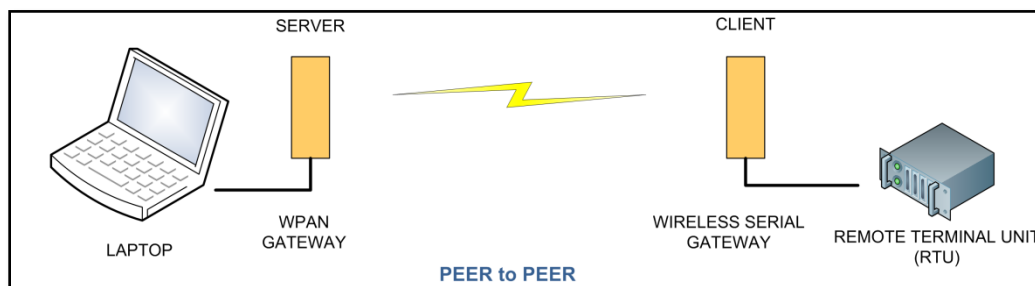
In a short range wireless connection scenario the same laptop is used, but the serial cable between the laptop and RTU is replaced by a Wireless Personal Area Network (WPAN) Gateway connected to the laptop and a wireless serial gateway (WSG) connected to the RTU. The functional difference between the WPAN gateway and the WSG is the firmware configuration. The WPAN Gateway acts as the server and the WSG acts as the client. The WSG constantly monitors the airwaves for a valid wireless connection. When a WPAN Gateway and WSG come within range a wireless link is established creating a "virtual serial cable". Once a connection is established, laptop software can talk transparently to the RTU. The WSG has the intelligence to indicate to the RTU when a valid connection has been established.



Technology

Low cost, short range wireless technology is used to establish the connection between the WSG and the WPAN Gateway. The devices utilize 802.15.4 wireless technology upon which custom firmware runs to manage the data flow. The WSG and WPAN Gateway communicate at 2.4 Ghz or 900 Mhz, providing a wireless range of 200-800 meters. Longer ranges can be achieved by using higher gain antennas. The data rate at which the system operates is typically < 250 kbit/sec, which is sufficient for most RTU communications.

The topology of the connection of a WSG and WPAN Gateway is peer to peer when a WPAN Gateway is connected directly to a laptop. However, if a Cypress Solutions modem is used in place of the laptop, the topology is a star network where multiple RTUs communicate to a WPAN Gateway connected to data modem. In the latter scenario, custom firmware running on the modem manages the data flow from the various RTU/WSGs. The laptop monitors the RTU data traffic by connecting to the modem's Ethernet port while the modem forwards the RTU data to a Central Station using cellular wireless technology.



Summary

In some cases a dedicated wireless link from an RTU to a Central Station is not a viable solution. Site visits and inspections are a regular part of infrastructure management in a variety of industries. Technology exists today that can remove some of the burden of those visits to better streamline and protect the personnel making those trips.