ZigBee Wireless Technology:
Leveraging low-power sensor technology for operational efficiencies
Whether it is saving time, money, or resources, operational efficiency is always a primary objective. ZigBee is an emerging technology gaining prominence in everything from smart-grid power management to home and building automation. The reason for its rising popularity is ZigBee provides unprecedented control over devices used every day like lights, HVAC systems, and appliances, as well as sophisticated applications that monitor and control important infrastructure systems like electricity and other utilities, all while consuming very little power, providing data reliability, ensuring security, and enabling a high degree of product interoperability. In short, ZigBee provides a low-power, high-performance solution to advanced operational efficiency.

ZigBee wireless networks have been in use for more than a decade, establishing the technology as a proven low-cost solution for a range of applications. As new applications continue to emerge, DAP Technologies is making the advantages of ZigBee more accessible to its industrial and field users by integrating ZigBee wireless technology into some of its rugged computers.

DAP’s M9010 rugged tablet computer is among the first tablets in the market to feature integrated ZigBee wireless technology. With advanced communications options, this sophisticated tablet with a 7-inch, sunlight-viewable touchscreen ensures wireless network connectivity without roaming, connects to multiple peripherals without wires, and simplifies data transfer. Integrated ZigBee technology further enhances these offerings by providing users a tool for controlling ZigBee networks and reading wireless sensors.

ZIGBEE EXPLAINED

ZigBee is a specification for a suite of high-level communications protocols using small, low-power digital radios based on the IEEE 802.15.4-2003 standard for Low-Rate Wireless Personal Area Networks (LR-WPANs). Advantages include:

- ZigBee uses the 2.4 GHz radio frequency to deliver a variety of reliable and easy-to-use standards anywhere in the world.
- Users can expect an extended battery life that could exceed 10 years for very low-duty applications, such as automatic meter reading, when using common alkaline batteries in a typical ZigBee product. For higher duty applications, battery life can range from 100 days to three years.
- Transmission distances are remarkable for a low-power solution, ranging from 1 to 1,000 meters (about 3 to 3,280 feet), depending on power output and environmental conditions such as other buildings, interior wall types, and geographic topology.

ZIGBEE USES

ZigBee is gaining market share from other technologies like Bluetooth as new uses for the reliable low-cost, low-power solution are developed for a variety of industries. Following is a sampling of some of the ways DAP computers with integrated ZigBee wireless technology can help solve problems and create efficiencies.
Utilities

Smart Grid Power Management

With worldwide power consumption on the rise, utilities are faced with the challenge of providing more power while reducing environmental impact. Smart grid management has emerged as a solution for managing output by providing electricity exactly where it is needed on the grid and when, thereby improving energy availability and reliability while improving regulatory compliance.

Low-cost ZigBee wireless technology can help manage demand response and load control with the additional advantage of individually or simultaneously targeting specific groups of devices including HVACs, water heaters, lighting, electric vehicles, and generation systems. Better efficiency reduces the need for additional generation plants and lessens environmental impacts.

DAP’s ZigBee-equipped M9010 rugged tablet is ideal for smart-grid maintenance giving field technicians a lightweight and rugged tool to assess, monitor, and repair the grid and individual meters while communicating wirelessly with the home office. When problems occur, field technicians can quickly pinpoint the source of an outage and communicate natively with the meter to identify the issue in order to restore power faster.

Meter Reading

Manual meter reading has long been the standard for measuring usage and billing customers. A far from perfect system, manual readings are plagued by human error, inaccessible meters, and estimated usage.

ZigBee offers the ability for advanced metering for multiple commodities including electric, gas, water, and thermal. In addition to measuring multiple measurement types including load profile, power factor, summation demand, and tiers, ZigBee offers real-time consumption and production information. With a ZigBee-equipped reader, a technician only needs to be within the read range of 10–15 meters in order to receive data from the meter.

Using DAP’s M9010 mobile tablet, utility companies can minimize human error and bill customers based on near real-time consumption rather than estimates based on previous or predicted consumption. Meter accessibility becomes a non-issue and customer satisfaction is increased.

Field Service

Appliance Repair

Service calls often begin with the customer describing an issue to the technician, who interprets a series of clues to assess the problem and identify potential part failures. But today’s appliances are smarter than ever before, many offering the ability to self-diagnose and “tell” the repair technician what’s wrong.

In many cases, this time- and resource-saving communication is facilitated by ZigBee technology. Equipping service technicians with DAP’s M9010 tablet puts accurate and near-instant diagnostics right in their hands, giving them the ability to complete repairs faster, boosting customer satisfaction and allowing them to reach more customers in a shift.
The multi-tasking functionality in the rugged tablets provides technicians the ability to track inventory with RFID or bar code scanning, access training documents, communicate with the home office, print customer receipts, and more.

**Building Automation**

Under the floors and behind the walls of most commercial spaces is a web of wires required to power, light, heat, cool, and control buildings. In fact, there are an estimated 11 million miles (18 million km) of existing data cable currently installed within commercial buildings in the United States alone. Despite their pervasiveness in buildings worldwide, wired systems are expensive to install, maintain, and reconfigure.

Replacing wired systems with wireless ZigBee networks reduces installation and remodeling costs, lowers lifecycle costs, allows for fast system reconfigurations, and earns LEED credits. With ZigBee, buildings with concrete, marble, cinderblock, high ceilings, and historical architecture can be controlled wirelessly and without expensive wiring or worry of damaging unique architectural features. And open floor plans, multi-purpose areas, or temporary spaces can be easily and inexpensively moved to suit the needs of tenants or one-time events.

The M9010 tablets provide a lightweight and rugged computer to manage building automation. Turn off and on lights for whole floors or buildings; reposition sensors for temperature, CO₂, light levels, and humidity; and achieve precise temperature control and more from a single computer.

**Trucking and Transportation**

**Cargo and Safety Tracking**

The M9010 rugged tablet uses ZigBee wireless technologies, GPS, and JBUS connections to collect and communicate valuable cargo, safety, compliance, and performance data in real-time.

ZigBee sensors can continuously monitor temperature and humidity inside a tanker or trailer. Recordings beyond a specified range are communicated to the M9010, which alerts both the driver and dispatch to any potentially damaging variances so they can be addressed before there is a safety issue or loss in cargo.

Likewise, ZigBee can also be used to identify safety issues like tire pressure, and provide at-a-glance readings in the cab and at the home office. ZigBee sensors, in fact, are already widely used in the automotive and trucking industries to monitor tire pressure. Used in conjunction with a mobile computer, ZigBee helps drivers stay focused on the road by continuously monitoring safety issues.
ABOUT DAP TECHNOLOGIES

For more than 30 years, DAP Technologies has been committed to understanding the evolving needs of industries that operate in challenging environments. We specialize in time-tested, forward-thinking hardware solutions customized to meet your needs today and flexible to solve the challenges of tomorrow.

DAP designs and manufactures a full range of rugged computers, including handhelds, tablets, and fixed-mount computers for demanding industries and harsh environments.

To learn more, please visit DAP Technologies at www.daptech.com or contact your nearest DAP office location.

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