

The GreenPeak Highlands



Letter from our CEO

The green vision of GreenPeak

Many people are aware of the tremendous waste of energy in our environment and the tremendous opportunity for conserving that energy. But how can we practically do something about it? For example, lights can be switched off when no one is in a room, and temperature can be lowered when employees are not using a meeting room. With the help of sensor networks, consumers and plant managers can better identify wasteful energy use and institute automated procedures, like switching off lights and lowering temperature, that facilitate the design of smarter, more efficient homes, buildings, and industrial plants.

Until now, the need for wires and cables have limited the widespread adoption of sensor networks by making them difficult and expensive to install and maintain. Wireless alternatives have emerged that simplify installation and reduce cost. But high power consumption and the corresponding need for regular battery replacement have prohibited the proliferation of wireless sense and control networks because of the maintenance burden of frequently replacing batteries. GreenPeak's technology takes wireless sensor networks one step further and will help solving this problem.

GreenPeak has overcome this problem by developing communication technology for wireless-sensor networks based on a different and low-power architecture that can use energy harvested from the environment. The biggest technical challenge is managing energy consumption without reducing range or functionality, like speed and standards compliance. The resulting elimination of battery replacement will then simplify maintenance and provide a higher level of safety and comfort.

GreenPeak introduces the first ultra low power transceiver-centric communication controller chip for wireless sensor networks. The Emerald GP500C is a standards compliant communications controller that incorporates a transceiver with a fully integrated communications layer and an on-chip energy manager. Unlike other solutions on the market, the Emerald GP500C device is an "autonomous transceiver" able to drive and control the data communication instead of being driven by a microcontroller. By greatly reducing energy consumption, this ground-breaking architectural concept enables end nodes to run on energy harvesting devices and to be truly wireless, free of power cords and free of batteries. The key for sense and control networks is: reliable communications without creating a maintenance burden. This is what customers have repeatedly told us.

Beyond that, the GP500C is a low cost solution. Since our chip is an integrated solution, all key functions and features are integrated and minimal external components are required. The total system bill of material (BOM) will be lower and makes the GP500C best in class for total system cost. The Emerald chip is easy to integrate and the development time will be greatly reduced.

I sincerely hope that our technology will help building a greener world. Copper has become a rare good and makes expensive and the ever increasing usage of batteries holds an ecological threat. By eliminating both in our ultra low power wireless sensor networks, I hope we can maintain an ecological balance, live within the resource limits of our planet and move to a more energy efficient economy.

Cees Links
Chief Executive Officer

WIRELESS & GREEN
COMMUNICATION TECHNOLOGY



The Green Case



Bell pepper farmers in Europe are facing fierce competition from farmers abroad, where climate conditions are often more conducive to growing vegetables. To address this problem, some of these farmers are installing cutting-edge technology to monitor and control enormous greenhouses and to promote the successful growth of bell peppers and other vegetables. These solutions use wireless sensors to monitor humidity and temperature to help create idyllic growing conditions.



GreenPeak's low-power mesh technology for mobile harvesting carts

Kronos, a global provider of human capital management solutions, has selected GreenPeak's low-power wireless mesh networking technology for one of their wireless terminals. This terminal is installed by one of Kronos partners in a picking administration system to monitor every individual picker's harvest details. This solution uses GreenPeak's wireless mesh technology to transmit data from individual mobile harvesting carts to routers, which enables the data to be gathered and analyzed in a central coordinator unit. The challenge was taking the system wireless in an area with wireless-adverse weather conditions, including high humidity, dense foliage and a lot of metal.

Result: 15% better picking results

Using the new solution, every picker in the greenhouse places the cut bell peppers in a personal mobile harvest cart. The vegetables are counted and transported via a conveyor belt to a central packaging unit. Pickers get remunerated exactly for the amount of vegetables they pick. This has resulted in an impressive 15% better picking results. Until recently, pickers were paid based on the collective crop, which was not motivating for better individual performance. With this solution of individual picking administration, the contract workers wages are linked directly to their achievements and this is proved to be great motivator.

Higher efficiency, richer crop and better cost control

The ability to track which areas have been harvested and how much has been picked also enables greenhouse operators to quickly implement corrections in spraying and fertilizing patterns thereby allowing for a richer harvest.

An additional benefit can be recorded in the other greenhouse logistics: the scheduling of the packaging unit can be better organized and just-in-time transportation can be planned for, which results in even better cost control.

Robust in radio unfriendly environments

A key factor in Kronos' decision to select GreenPeak's wireless networking technology was its excellent performance in radio unfriendly environments. GreenPeak's multi-hop, mesh technology enables each wireless sensor and actuator device, utilizing integrated mesh software, to act as a repeater for other wireless devices even if one or more would become blocked by changes in the greenhouse structure. This approach enables the network to span larger distances (even when individual nodes can only see a local area of the network), allowing site-wide wireless coverage throughout the greenhouse.

The glass house environment is harsh for radio waves: it is metal rich, with extreme high humidity levels and dense foliage. Kronos researched several wireless solutions, but found that many of the solutions came up short. GreenPeak provided Kronos with a robust and reliable solution which proved to be successful in the most demanding scenarios used during the testing period.

Kronos

Alain Van der hoeven, VP Marketing and Business Development Kronos Western Europe states:

" We first tested Wi-Fi, but the radio coverage in the greenhouse was not satisfactory. We also tried a ZigBee solution from one of GreenPeak's competitors, we were not satisfied on the performance of the technology and the local support. GreenPeak was the only company that could provide us a technology, wireless mesh network solution that answers correctly the needs of our customers and is providing the support we expect from a partner.

We needed GreenPeak in the development of this application for their expertise and outstanding competence in the IEEE 802.15.4/ZigBee area, but we also appreciate their high level of customer support and responsiveness. We enjoy working with their team and we have built a partnership, rather than a customer/supplier relationship. I'm confident we will continue working with GreenPeak for other wireless labor and production registration systems as well. "



GreenPeak launches the Emerald GP500C communications controller

The Emerald GP500C is the only IEEE 802.15.4 standard compliant chip available today with extreme low power features enabling energy harvesting solutions in wireless sensor networks.

GP500C-driven networks powered by energy harvesting bring true maintenance-free operation

In addition to being best in class for energy consumption, GreenPeak's radio creates superior reliable communication over a significant indoor range (30-50m, 100-150 feet) because it utilizes embedded hardware based antenna diversity that reduces dead spots. Furthermore, the Emerald includes other link reliability features such as message-over-message enabling, excellent sensitivity, a robust signal processing engine as well as interference detection and avoidance mechanisms.

Designs using the Emerald GP500C communications controller are fully IEEE 802.15.4 compliant. Developers have the option to use GreenPeak's ultra low power networking protocol which reaches beyond standard implementations while maintaining standard compliance.

The Emerald GP500C only consumes a fraction (10-25%) of the energy of traditional microcontroller based designs (depending on the usage profile) by using a lower peak current, an ultra low leakage current, and very short transmission times via just-in-time transmission scheduling.

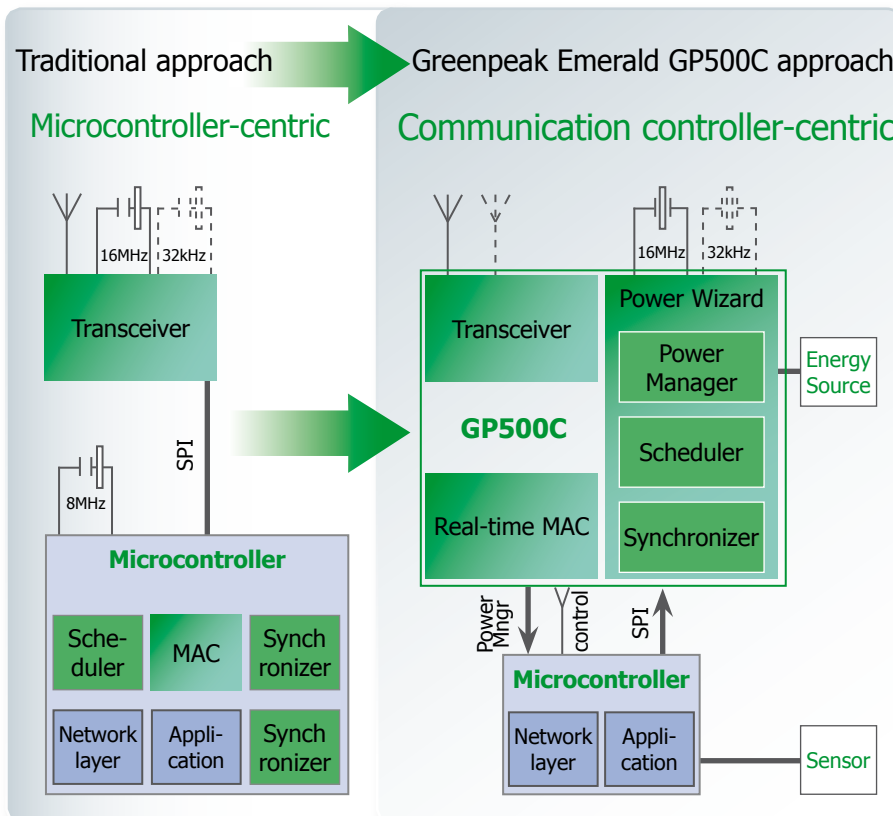
The Emerald GP500C is delivered with a reference design and development kit that allows OEMs to build their own communication modules and applications. The GP500C also will support a wide range of software stacks that can run on different processors including ZigBee as well as Low Power Routing, Low Power Sensing (robust communication under intermittent power availability), a Micro stack and other application-dedicated low power protocols.



The Emerald GP500C typically saves up to 85% of the energy of comparable products



The GP500C's low energy consumption allows developers to build sensor systems with a peak current of about 20mA (two times lower than typical) and a system sleep mode of below 100nA (ten times less than typical) without compromising the network reliability.



GP500C Features

- ▶ IEEE 802.15.4 compliant 2.4 GHz worldwide band
- ▶ Supports a variety of ultra low power networking protocols
- ▶ Data rate 250 Kb/s
- ▶ Range 30-50m 100-150 feet
- ▶ Robust reliability based on embedded hardware antenna diversity
- ▶ High level of integration enables system level cost savings
- ▶ Hardware features
 - ▶ Integrated transceiver/communications controller
 - ▶ Communication scheduler
 - ▶ Standby controller
 - ▶ Power supply manager
- ▶ Energy consumption
 - ▶ Sleep current: 100 nA compared to 1 μA typical
 - ▶ Communication current: packet processing at least 65% less energy

▲▲ The Emerald GP500C has a ground-breaking architectural concept. It is a communications controller that incorporates a transceiver with a fully integrated communications layer and an on-chip energy manager. Unlike traditional solutions, the Emerald GP500C device is an "autonomous transceiver" able to drive and control the data communication instead of being driven by a microcontroller. This allows the GP500C to greatly reduce energy consumption and enables end nodes to run on energy harvesting. GP500C-driven networks become truly wireless, free of power cords and free of batteries.

New GreenPeak US Office

GreenPeak has opened a US office in Austin Texas to better serve customers and prospects in the Americas and thereby strengthening its business activities.

Barry Blount, Director of Business Development, has been named to head this new office and drive business development in the USA.

Cees Links, CEO of GreenPeak Technologies:

*Barry Blount
Director of Business Development USA*

“ Establishing a new office in the US is a logical next step in our approach to global expansion. The opening of this office reflects our commitment to better serve the US market. By strengthening our sales and service network, we improve our ability to meet and understand the needs of our US customers. Our continued growth and strong customer demand in the US, combined with our new office, proves that we’re on the right track.

I believe Barry’s expertise and his many years of experience in the semi-conductor industry will be of great value to our customers. After the successful launch of the Tokyo sales office in Japan, the new US office will help GreenPeak to lead the way as a technology innovator. ”



Training for ultra low power wireless sensor networks utilizing energy harvesting

The GreenPeak Academy provides an educational, training and consultancy platform for ultra low power wireless sensor networks. GreenPeak initiated the platform to address growing corporate demand for know-how in developing and deploying ultra low power sense and control networks.

The GreenPeak Academy training program is part of a high-quality, long-term commitment to providing world class training for the wireless sense and control industry, and facilitating widespread deployment of this emerging technology. It is also part of GreenPeak’s ongoing campaign to quickly train new staff, which is essential for supporting the GreenPeak team’s rapid growth.

GreenPeak’s training programs will focus on key design challenges for ultra low power wireless sensor applications, and utilize real-life cases to show participants how to determine the lowest possible energy consumption. This illustrates GreenPeak’s commitment to helping customers tap into the full potential of wireless sensor networks.

The GreenPeak Academy features one-off seminars, advanced training, and webinars, all supported by a team of experienced, carefully selected trainers and consultants. All team members are experts in ultra low power sensor networks, possessing a solid theoretical foundation backed by comprehensive practical know-how.



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