

PRODUCT
CATALOG

2018-2019



Welcome Readers

At Smartrek, we believe that connectivity should be made simple. That's why, our development team has worked relentlessly to provide you with innovative products and solutions. We stand by the creativity, skills and dedication of our staff, as well as by high-quality products and services. This year, we are proud to offer our new long-range Portia SpiderMesh module certified for Europe, North America and Australia.



For us, quality, customer satisfaction, innovation and integrity are driving forces behind the company. We strive to offer our clients with cutting-edge solutions to the Internet of Things future that add real value to their business as we understand that our success is measured by their own success.

To conclude, I would like express my gratitude for your continued trust.

A handwritten signature in black ink that reads "Martin Carrier".

Martin Carrier

CEO

[Smartrek Technologies inc.](http://www.smartrektechnologies.com)

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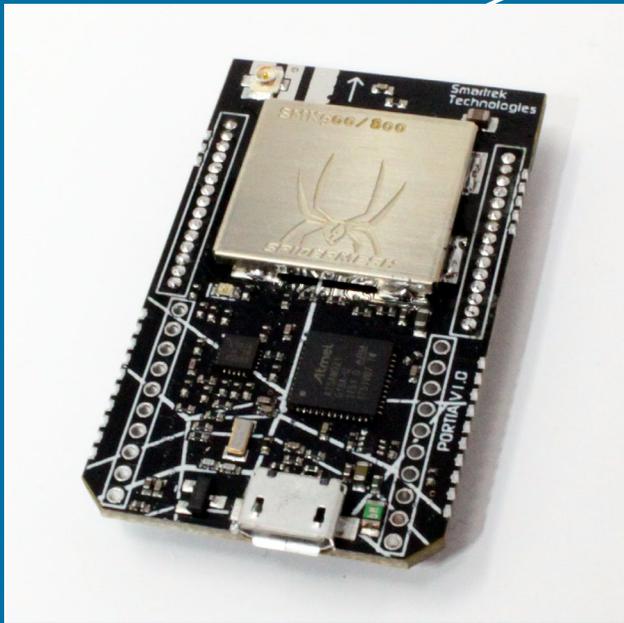
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THE FUTURE OF CONNECTIVITY IS **SpiderMesh**

LPWA Wireless Cooperative Mesh Technology

SPIDERMESH

COOPERATIVE MESH TECHNOLOGY



Spidermesh

Cooperative Wireless Mesh Technology

The SPIDERMESH proprietary cooperative wireless mesh technology features synchronous communication between nodes to mitigate typical contention issues in mesh topology networks. Using this strategy, the wireless technology offers a solution to the most challenging applications.

With its scalability, SPIDERMESH overcomes the typical limitations inherent in deploying large amount of sensors in high occlusion environments such as forests and mountainous areas, with almost no design tradeoffs, thereby delivering a powerful and low-power platform for the Internet of Things.

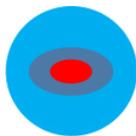
Why Mesh?

Defining an array of sensors

A sensor network can be viewed as a network of autonomous microsystems (battery operated) scattered in a given space and communicating with each other via a wireless link. In such a network, the user can contact the sensors through a gateway, which bridges the sensor network and the main computer.



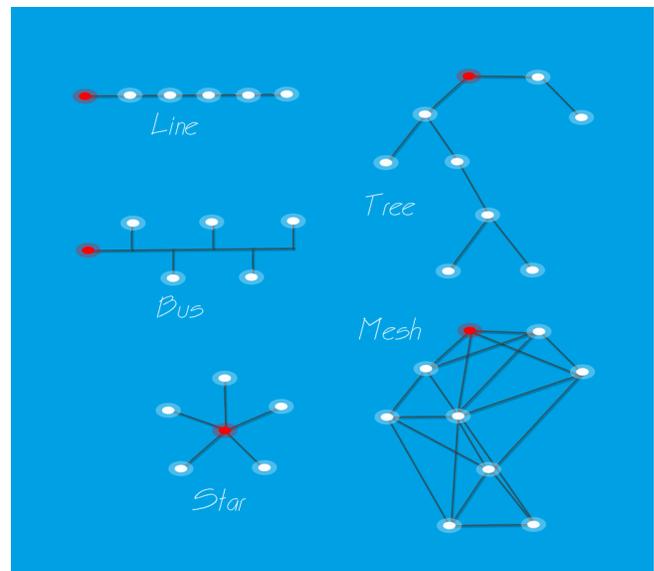
THE SENSORS



THE GATEWAY

Wireless network topology

Today, wireless networks are ubiquitous everywhere, in many fields of application. However, they are currently not widely used for outdoor long-term deployments for applications requiring a large area coverage when grid power is unavailable.



Why?

Because most installations use a wireless star network topology in which sensors communicate directly to the master node, gateway, and therefore do not interact in any way with their neighbors.

Except...

When there are obstructions in the line of sight between sensors and their gateway, communication is no longer possible. There are three common patches widely used in this case.



POINT TO POINT NETWORKS

Increase the gateway height to mitigate many types of occlusions

But

- Installation of a tower is a very expensive investment
- Installation of a tower involves a lot of time, cost and effort



GSM NETWORKS

Use external infrastructures to solve communication issues

But

- Availability of infrastructures varies from place to place
- Subscriptions to a public or private external network add overhead



TREE NETWORKS

Distribute the network with a predefined hierarchy. The communication routes are pre-programmed

But

- Unreliability caused by single point of failure.
- Bottlenecks slow down communication and increase power consumption



MESH NETWORKS

In a wireless mesh architecture, data is carried over large distances by splitting the distance into a series of short hops. Intermediate nodes not only boost the signal, but cooperatively pass data from point A to point B by making forwarding decisions based on their knowledge of the network. In such a wireless network, traffic flows between arbitrary pairs of nodes, but in an asynchronous way: any nodes can transmit data at any time (first come-first served). Unlike tree topology, a node that fails does not cause an entire sub-section of the network to fail.

When a node goes out of service, the data takes an alternative route since the messages are relayed by flooding, without a predefined route. This architecture reproduces, in a way, the Internet model while optimizing for wireless. This solution allows fast and simplified deployments, supports scalable coverage, ensures high fault and interference tolerance, and significantly reduces network installation and operating costs. While very efficient with limited number of peers, the system breaks down rapidly with the network size.

When two nodes attempt to transmit data at the same time, data packets collide. As a result, typical mesh technologies will handle this eventuality by having the nodes either

- listening to the network and wait for it to quiet down before transmitting, or,
- re-transmit collided data until the transmission is successful.

SPIDERMESH

COOPERATIVE MESH TECHNOLOGY



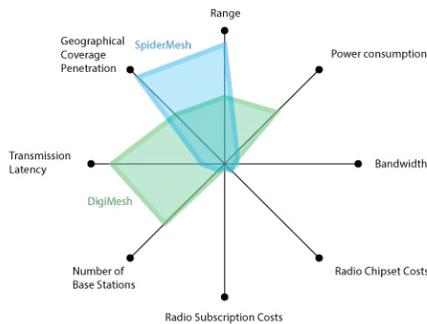
WE TAKE THINGS FURTHER with our

COOPERATIVE MESH TECHNOLOGY

In a wireless cooperative mesh topology, network traffic is synchronized. There are no data collision in such an architecture since every nodes have a precise communication slot allocated.

As a result, a wireless sensor network (WSN) using this topology can scale up in size without the performance degradation shown in standard mesh networking strategies. That makes the technology exceptionally low-power which eliminates the use of solar-panels in most applications. SpiderMesh allows to:

- reduce energy consumption (and eliminate the need for energy capture),
- increase the reliability and robustness of the network,
- self-repair communication paths in the event of network failures or breakdowns,
- deploy a virtually unlimited number of sensors on the same coordinator (with high collision attenuation),
- facilitate the installation and future maintenance of the network



Standard mesh vs. SpiderMesh

Mesh synchronization makes it possible to counter the well-known effect of transmission degradation with the increase in traffic on the network, and therefore with the increase in the number of nodes. Unlike standard protocols, which retransmits in the event of a packet collision, the SpiderMesh technology makes it possible to avoid these collisions, hence the achievement of unequalled performance in terms of power consumption and network size.

Technical specifications of the Spidermesh protocol

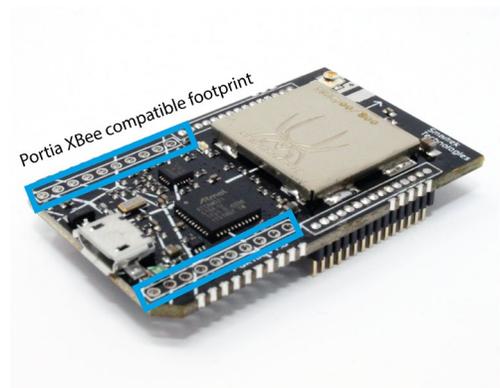
Type of wireless technology	FSK wireless cooperative mesh
Max. polling speed (RF-AirEVM mode)	200 ms per node
Max. polling speed (serial port mode)	100 ms per node
Min. polling speed	> 16 s per node
Number of nodes on a gateway	Virtually unlimited
Max hop count	> 30
Encryption	AES-128

SpiderMesh compared to standard wireless technologies

Type of wireless technologies and their features	GSM	Tree	Mesh	Cooperative Mesh
	Point-to-point/star network Each node or each hub is connected to the cellular network	Pre-defined hierarchy	Ad-hoc network	Synchronous communication
Reliability (self-healing)	✓		✓	✓
Dynamic routing (self-configuring)	✓		✓	✓
Scalability (200+ nodes/network)	✓	✓		✓
Self-sufficient (no internet/cellular required)		✓	✓	✓
Low-power consumption	★★★★★	★★★★★	★★★★☆	★★★★★
Cost effective	★★★☆☆	★★★★★	★★★★★	★★★★★
Polling rate	★★★☆☆	★★★★★	★★★★☆	★★★★★

SpiderMesh compatibility layer

SpiderMesh has been designed for easy implementation and includes a DigiMesh transparent layer. Combined with the Portia SpiderMesh enabled radio module, which features an XBee compatible footprint, the upgrade from one technology to the other is made easy.

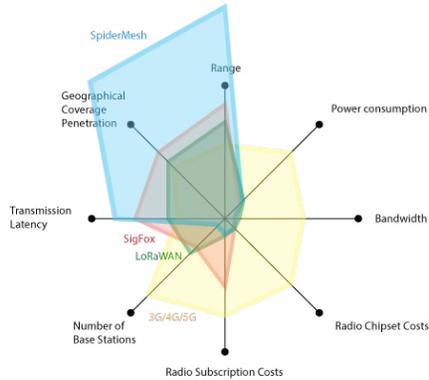


PORTIA radios transceivers provide an extremely high wireless range. These modules are equipped with a serial port, digital and analog inputs/outputs, I2C and SPI communication ports. They also feature Xbee (SMD and DIP) footprint compatible connectors in order to reduce friction when migrating existing systems to SpiderMesh enabled PORTIA radios. For tasks requiring real-time execution, a co-processor is made available in addition to the main processor.

For more information, refer to the PORTIA programmable radio module datasheet.

SPIDERMESH

COOPERATIVE MESH TECHNOLOGY



Spidermesh LPWA technology

Designed for high coverage, low-power IoT applications

Low Power Wide Area (LPWA) technologies were introduced about a decade ago. Before the emergence of these networks or protocols, the main methods of accessing data were based either on mesh networks using short-range communication technologies (WPAN, WLAN) or on long-range cellular technologies.

Multi-hop short-range transmission technologies, such as ZigBee and Bluetooth, were once considered a viable way to respond to the growing market need for inexpensive, wide area coverage connectivity for IoT applications. Unfortunately, although these technologies involve very low energy consumption, very limited coverage and poor deployment mechanism hinder their development in the IoT.

LPWA technologies are now emerging as a core enabler of the IoT. They offer the potential to significantly simplify deployments by enabling low-cost, low-power, high coverage connectivity in each endpoint. Thus, they will be the key to the development of Smart City applications and it will also enable a new generation of IoT applications that were not achievable.

Many different LPWA technologies are currently battling with competing claims for position.

Current LPWAN networks lack in flexibility and are monolithic. In order to extend them, new terminals or coordinators must be installed and connected to the rest of the network by another wired or broadband technology. However, with the addition of nodes, signal quality becomes unpredictable beyond a certain limit. Increasing the transmission power therefore becomes the only option to increase the range when it is not possible to install new infrastructure. Spidermesh technology adopts a completely different architecture. By collaborating synchronously, the system nodes allow greater distances to be covered while maintaining signal quality and throughput.

Spidermesh is the only technology that can cover thousands of square kilometers on a single coordinator. Because of the meshed capabilities, even areas that are not yet served by operators can now easily deploy networks, without the added complexity of building new infrastructures. This means that wireless networks can now be extended to forests, mountains, rural and less developed regions

Popular LPWA technologies vs. SpiderMesh

Due to its synchronous design, the Spidermesh protocol is by far the protocol that offers the best scalability, among other things because network expansion does not add any additional complexity. With typical LPWAN systems, the addition of new objects inherently increases noise and the destructive collision of radio waves.

SpiderMesh compared to other LPWA technologies

Type of LPWAN technologies and their features	LoRaWAN	SigFox	NB-IoT	SpiderMesh Cooperative Mesh
Type of LPWAN technologies and their features	Chirp Spectrum Modulation	UNB-WAN BPSK Modulation	Narrow-Band QPSK Modulation	FHSS Modulation
Energy consumption	Variable	★★★★★	★★★★☆	★★★★☆
License	Unlicensed band	Unlicensed band	Licensed band	Unlicensed band
Bidirectional communication	✓	Limited	Limited	✓
Range	5 - 20 km	10 - 40 km	1 - 10 km	Virtually unlimited
Authentication & encryption	✓		✓	✓
Adaptive data rate	✓			✓
Allow private networks & cohabitation	✓			✓
Maximum message/day	Unlimited	140 in / 4 out (12 bytes packets)	Unlimited	Unlimited
OTA update			✓	✓
No subscription	✓			✓
Hardware cost	★★★★☆	★★★★★	★★★★☆	★★★★☆
Overall performance/cost	★★★★☆	★★★★☆	★★★★☆	★★★★★

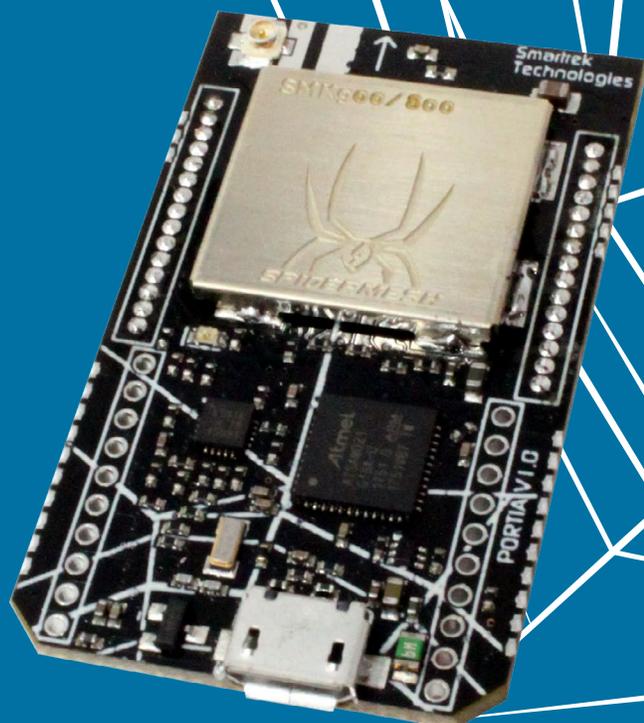
Security

Security is a key aspect of LPWAN deployments, regardless of the application area. One example is the monitoring of public services in municipal infrastructure that require an uncompromising level of data security. Technologies such as SigFox and NB-IoT do not provide data protection assurance since all the data traded from connected objects circulates in a single, proprietary infrastructure. Although these infrastructures implement extreme security mechanisms, they are still centralized. Thus, if they were to be the target of malicious activities, if breached, all connected devices and their data would be exposed to the outside world, which is of concern.

The health and safety of citizens served by public services and infrastructures depends precisely on their integrity. In the case of SpiderMesh, all networks are decentralized and access to data is therefore difficult to breach.

RADIO MODULES

Featuring SpiderMesh LPWA Wireless Cooperative Mesh Technology, OTA updates, AES-128 encryption, embedded virtual machine, low power, FCC and ETSI certified





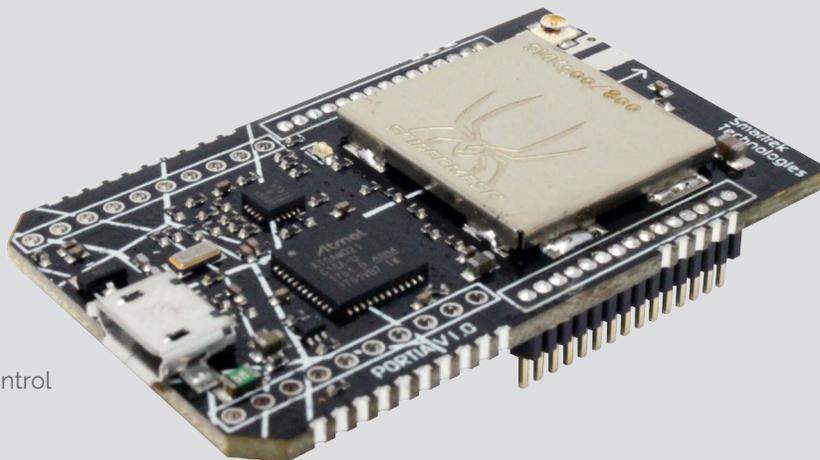
RADIO MODULES

SPIDERMESH

NEW PORTIA

PROGRAMMABLE MODULE

- Low power application (IoT)
- True Cooperative Mesh Networking
- Long Range Communication
- AES 128 bits Encryption
- Analog and Digital I/O For Sensing/Control Applications
- Virtual Machine Upgradeable OTA
- Fully customizable co-processor
- Xbee compatible footprint



Portia v.1.0

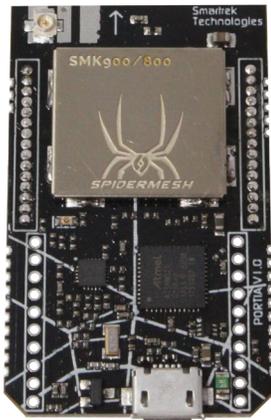
PORTIA radio transceivers provide an extremely high wireless network range. To achieve this, radios use the proprietary SPIDERMESH technology, a cooperative mesh wireless protocol developed by Smartrek Technologies. This protocol provides synchronous communication between the links to mitigate network contention issues. This strategy allows PORTIA radios to offer a connectivity solution for the most challenging applications.

Each of the radios can be configured either as a gateway or as a node. Gateways control the entire mesh network by coordinating wireless data exchanges. They also act as a bridge between mesh networks and a host such as a computer, tablet or internet gateway.

The nodes act as repeaters within the linked networks. Data transfer is bidirectional, and thus, nodes allow for controlling and/or reading digital/analog external modules, therefore connecting them to the mesh network. Activating a link in the field only requires the node to be on the same radio frequency channel as the network during deployment. This considerably reduces installation complexity as there is no technical knowledge required for its use.

Specifications

General	
Dimension	1.140" x 1.890" (29mm x 48 mm)
Operating Temperature	-20 to 70 C guaranteed for max hop count / -40 to 85 C guaranteed for half hop count
Storage Temperature	-40 to 85 C
Antenna Connector	U.FL
Encryption	AES 128 bits
Virtual Machine Memory	16 KBytes
Internal Modules	1x TTL Serial port, 13x GPIOs, 1x SPI, 1xI2C, 2x ADC channels, 1x channel
Serial Baud Rate	2400, 4800, 9600, 19200, 38400, 57600, 115200, 125000
Coprocessor	8 kbytes flash memory, 128 bytes EEPROM, 512 bytes SRAM



Europe

ETSI 869MHz standard frequencies

Transceiver	
Urban / Indoor / NLOS*	100 - 500m
Outdoor / LOS**	> 10 km
Transmit Power	Low: 25mW High 100mW
RF Data Rate	50 Kbits
Nb. of Channels	5
Frequency (Mhz)	869.425 to 869.625 MHz
Receiver Sensitivity	- 110 dBm

Electrical characteristics

Supply	3.3-6.5V
All input/output pins	-0.5 to 3.3V
Transmit Current	130mA peak
Receive Current	20mA
Sleep	30uA

North America

FCC 915MHz ISM standard frequencies

Transceiver	
Urban / Indoor / NLOS*	100 - 500m
Outdoor / LOS**	> 10 km
Transmit Power	Low: 50mW High 100mW
RF Data rate	50 Kbits
Nb. of Channels	6
Frequency (Mhz)	902 to 928 MHz
Receiver Sensitivity	- 110 dBm

Electrical characteristics

Supply	3.3-6.5V
All input/output pins	-0.5 to 3.3V
Transmit Current	130mA peak
Receive Current	20mA
Sleep	30uA

* NLOS: None Line Of Sight

** LOS: Line Of Sight

RADIO MODULES

SPIDERMESH



The mesh network algorithm synchronizes all wireless communications over time. This reduces energy consumption in order to achieve very long network operating time. Most applications can reach an autonomy ranging from 12 to 48+ months per link, depending on the batteries type and capacity and the network refresh time. With these low energy specifications, PORTIA radios offer a powerful solution for object connectivity.

Serial interface

PORTIA radios have 2 serial communication modes to interact with the mesh network. The first mode is transparent and all data received on the serial port of a node will be transmitted to all other nodes. The second mode uses a programming interface (API). Messages transmitted on the serial port contain an address and a command which allows you to specify a node or to communicate to all nodes simultaneously.

Virtual machine and over-the-air updates

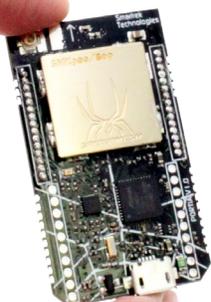
PORTIA radios feature an embedded virtual machine allowing over-the-air firmware updates. This allows application-specific user scripting to control the internal modules of the PORTIA radio and ease interfacing with external sensors, without needing supplementary glue logic. The execution of the virtual machine is made possible by sharing the resources of the main processor used for wireless communications.

Hardware

PORTIA radios are equipped with a serial port, digital and analog inputs/outputs, I2C and SPI communication ports. They also feature Xbee footprint compatible connectors in order to reduce friction when migrating existing systems to SpiderMesh enabled PORTIA radios. For tasks requiring real-time execution, a co-processor is made available in addition to the main processor.



Sensitive data can be secured using 128-bit AES encryption.





DEVELOPMENT KITS

SMARTREK PORTIA SPIDERMESH

Smartrek Portia SpiderMesh Development Kits are a great introduction to the use of Smartrek Portia RF modules for device connectivity. These kits are provided with the SpiderMesh advanced cooperative mesh technology. Spidermesh is a proprietary networking topology in which a dense node network communicate collaboratively through a self-healing synchronous mesh.

Performance

Indoor/Urban Range: 1000 ft to 2000 ft

Outdoor/Line-of-Sight Range: > 10 km

Hardware

Frequency Band: 902 to 928 Mhz / 869.425 to 869.625 MHz

Gear Box Regular

Kit contents

- 3 Smartrek Portia RF modules
- 3 Portia serial interface boards
- 3 Micro-USB cables
- 3 Wire antennas



Simple Connect
THAT WORKS!

Activity



Smartrek Technologies

PLUG N' PLAY Monitoring



Our goal is to help others realize the promise of the IoT revolution. That's why we provide the ready to launch pre-integrated sensors solution.



Report

MAP NODES LOG CAM CHAT CFG

Vacuum sensor

Default

P1 L3a	0.0 inHg -18.4 °C
P1 L3b	0.0 inHg -17.2 °C
P1L4	0.0 inHg -18.5 °C
P3 petit dompeur	-0.0 inHg -18.0 °C
P4L24a	0.1 inHg -19.6 °C
P4L24b	-0.2 inHg -13.7 °C
P4L25	-0.1 inHg -16.0 °C
P4L26	-0.0 inHg -19.7 °C
P4L27	0.0 inHg -18.5 °C
P4L28	0.0 inHg -14.4 °C
P4L29	0.0 inHg -15.1 °C
P4L30	0.1 inHg -18.4 °C



SMARTREK PLUG N' PLAY

MONITORING & AUTOMATION



Modular



Low Cost



User-Friendly



Ready to Use

The Plug-n'-Play

Smartrek Monitoring System

Our goal is to help others realize the promise of the IoT revolution. We provide the Smartrek Monitoring System which can be used in various applications, from water management to agricultural monitoring. In a matter of minutes, you can embark into the revolution and ease the burden of data collection, detect and prevent failures, improve management efficiency as well as increase productivity.

The Smartrek Monitoring System is tailored for deployment of WSN (Wireless Sensors Network) from basic to the most challenging locations, and is designed with smooth end-user experience in mind. Multiple sensors are connected to the system via a one-step installation procedure. Data can then be accessed using the provided Android App, or remotely from the Web 2.0 App if the system is configured to send information to the Cloud.

Gather Big Data

Setup Alarms

Upload to the Cloud

Get real-time data as fast as every 2 seconds.

Setup thresholds to ensure that you are notified on time when it matters.

Use our free Cloud platform to automatically upload data and manage remotely with peace of mind.



Features

The turnkey monitoring system is provided with both an Android App and a Web App to manage/control your system.

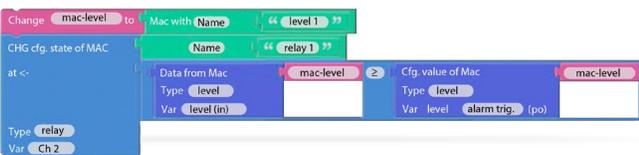
- Native Android App/Web App
- Analytical tools such as charts/history
- Real-time readings and data-logging
- Sound/speech/e-mail/SMS alarms
- Intranet network messaging
- Equipment control
- Custom automation



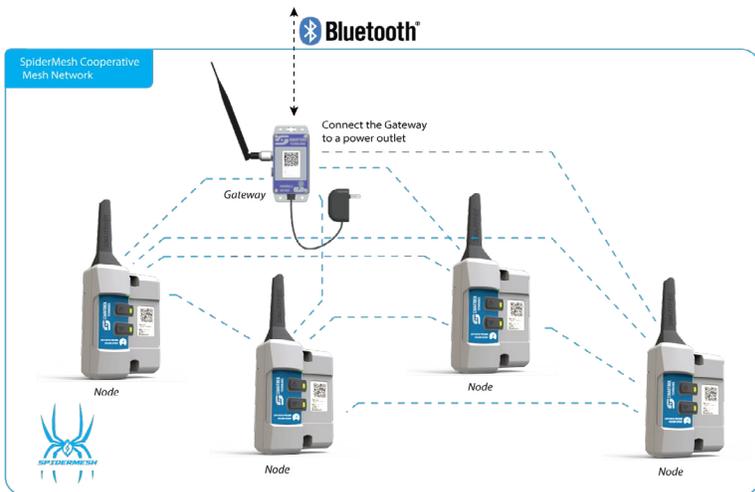
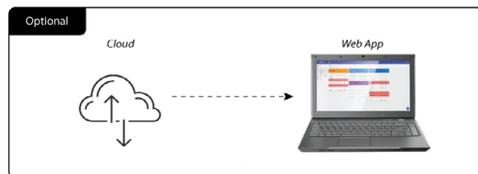
Easy Automation

Automate easily using the visual block programming integrated to our App. Trigger an equipment when another sensor has reached the desired threshold.

- Custom automation
- Block programming/JsCustom automation



★
INFO



Application examples



Agricultural/Environmental
Monitoring in rural, forested, mountainous areas.



Industrial/Municipal
Monitoring in urban canyons, tunnels.

Overview

Smartrek sensors communicate over a cooperative mesh network. That is, they all take turns and exchange data to the network coordinator, the Gateway. Once data have been received, the Gateway transmits them back to a computer (tablet or smartphone) over a Bluetooth link. The user will then have access to all the information on the status of the system, either on a computer and/or, optionally, on the Cloud. Since network communication is bidirectional, users can not only manage sensors alarms and view historical data, but can also control, activate/deactivate equipment.



SMARTREK PLUG N' PLAY

MONITORING & AUTOMATION

Smartrek Sensors

A wide variety of pre-integrated sensors are provided to monitor various parameters. Most of the devices are operate on 3x D-cell alkaline batteries with an autonomy ranging from 2 to 7 years (depending on sampling rate which can be as low as 0.5s per sensor). The devices use the SpiderMesh extremely low-power consumption wireless technology (no solar panels required). Typical range between adjacent sensors is 250m to 500m in high RF occlusion environment (decidious forest), and 10+ km LOS. Total range is extended further with the network allowing for 30 hops (i.e. 15km or 500m x 30 hops in forested conditions, and 300km or 10km x 30 hops with LOS).

Base Components



Gateway

The gateway is the network master or coordinator. It controls all network parameters such as data polling rate and hop counts. It also sends data for you to view on devices such as a tablet.

Specifications	
Range Urban/Forest	250m – 500m
Range LOS	> 10 km direct line of sight
Power	5V adaptor
Optional Power	Li-po backup battery
Temperature rating	-20C to 40C
RF technology	SpiderMesh
Category	Master

We continously integrate new sensors and can also provide engineering counseling or development for on-demand customization.



Tablet (HMI)

The tablet allows you to interact and control the monitoring system. The gateway sends data directly to the tablet via Bluetooth. When connected to the internet, the tablet can also upload data to the Cloud for remote system viewing/control.

Minimum requirements
Android OS 4.0+ (ICS, Ice Cream Sandwich)
Bluetooth 2.0+
WiFi
Camera
microSD card slot (recommended)
SIM card slot (recommended)

Supported devices
Samsung Tab E/Tab E LTE/Tab A 8/S5/S6/S7
Lenovo Yoga Tab Pro



Repeater

Network extender

The repeater does not take any measurements. It rather relays signals to other nodes in the same network. The repeater bridges two network sections together, strengthens weak network points and adds signal redundancy to avoid bottlenecks.

Specifications

Power 3x D-cell alkaline batteries

Dimensions 15 x 5 3 in

Range 250-500m in high occlusion conditions 10+ km LOS



Handheld

Portable gateway for network roaming

The Handheld Is typically used for roaming inside of the network when internet is unavailable. It acts as a passive gateway. The handheld unit can also be configured as an active gateway with battery backup.

Specifications

Power 1200 mAh Li-Po battery with 5v charge plug

Dimensions 5 x 3 x 1.5 in

Usage Roaming, test messaging, control (master or slave)



Vacuum

Gas pressure monitoring

The Vacuum sensor measures one or two gas vacuum pressure. It also monitors ambient temperature.

Specifications

Power 3x D-cell alkaline batteries

Accuracy pressure: ± 0.25 FS, temperature 0.1 C

Ports 1 port, 2 ports

Pressure range -15 to 150 psi range, customizable

SMARTREK PLUG N' PLAY

MONITORING & AUTOMATION



Pressure

Positive/Negative pressure monitoring

The temperature compensated Pressure sensor monitors high/low pressure.

Specifications	
Power	3x D-cell alkaline batteries
Sensor type	Absolute, Gauge, Sealed Gauge
Barometric compensation	Internal External (optional)
Pressure range	-1 - 0 barg, -14 - 100/0 - 300/0 - 1000 psig, 0 - 1.5 bara, call for custom



Pressure transducer

For Pressure/Tensiometer nodes

The piezoresistive transducer includes a flush diaphragm and features a SS body.

Specifications	
Various pressure range	
Temperature compensation	
Suitable for nearly all aggressive media	



Cable

M12 cable

M12 male to female Cable for Pressure/Tensiometer/Thermometer sensors.

Specifications	
Connector	M12 male
Connector	M12 female
Length	90 cm



Ultrasonic Level

Ultrasonic height or bin/tank level

The ultrasonic level sensor measures height, bin or tank level. Various beam pattern can be available upon request. The measured target can be either hard, soft, or liquid.

Features	
Power	3x D-cell batteries, 9V power adaptor (optional)
Accuracy	1 %
Level range	200 ... 10 000 mm
Resolution	1 ... 10 mm
Options	Self-cleaning, chemical/corrosion resistant



High Power Ultrasonic Level

Ultrasonic grain/bin level

The high power, non-intrusive ultrasonic level sensor uses the Hawk Mini Wave self-cleaning sensor to measure grain/bin/liquid height.

Specifications	
Power	3x D-cell alkaline batteries
Self-cleaning	Yes, dusty, high condensation environment
Usage	Grain/bin/liquid level



High Power Ultrasonic sensor

This is Premium tool for you

High power self-cleaning ultrasonic level transmitter.

Specifications	
Resolution	1 mm
Maximum range	12 m
Accuracy	±0.25 % of max range
Enclosure sealing	IP67

SMARTREK PLUG N' PLAY

MONITORING & AUTOMATION



Water Depth

Hydrostatic depth and temperature

The Water depth sensor measures hydrostatic depth and temperature and is available for various ranges from 10 to 120 m. It includes an on-board barometric sensor for automatic compensation, thereby eliminating the use of vented cables.

Specifications	
Logging	In sensor head and in Smartrek Logger
Hydrostatic depth range	10/30/60/120 m or customize
Sampling rate	15 to 900s adjustable



Cable

Non-vented cable

This cable is to be used with our regular hydrostatic depth transmitter. Venting is not required with the external barometric on-board sensor provided with the node.

Specifications	
Length	Custom



Hydrostatic Depth Transmitter

dipperLog Nano

Piezoresistive pressure transmitter featuring a 316 SS body. It is equipped with a battery and EEPROM to store 32 000 data sets.

Specifications	
Logging	Yes
Range	10/30/60/120 m
Accuracy	0.05% FS, 0.25%FS for 120m
Battery	3.6V li, 7 years @ 5 min samp.



Water Depth for Explosion-Proof Sensor

Explosion-proof hydrostatic depth transmitter

The Water depth sensor measures hydrostatic depth and temperature and is available for various ranges from 0 to 5/10/ 15/20 psi. It includes an on-board barometric sensor for automatic compensation, thereby eliminating the use of vented cables.

Specifications

Logging	In Smartrek Logger only
Hydrostatic depth range	10/30/60/120 m or customize
Sampling rate	15 to 900s adjustable



Pressure Level Transmitter

Explosion-proof with SS cage

The explosion-proof pressure transmitter measures water depth and can be used in slurry and dirty liquids. It features an optional SS cage

Specifications

Rating	Class 1, Div1/Zone 0
Protection	Optional SS cage
Range	0 to 5/10/15/20 psi
Media	Dirty liquids



Lift Station Option

Water depth node add-on

Lift Station add-on option for the Water depth explosion-proof node version. Additional features are 1-3x dry contacts for float switches monitoring

Specifications

Dry contacts	1/2/3/4x
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SMARTREK PLUG N' PLAY

MONITORING & AUTOMATION



Relay

Remote Equipment Control

The relay node can control up to two electrical equipment remotely, monitor two currents and two dry contact states. It is compatible with any electrical system (120V, 220V, 600V, etc.).

Specifications

Power	24 V Power supply
Channel output	24 V
Input	Current sensors, switch sensors
Control	Remote, local (manual override)



Ampmeter

Non-Invasive Current Sensor 100A

The split-core, non-invasive current transformer sensor measures current from alternating current (AC). It is used with the Relay node.

Specifications

Input Current	0 - 100A AC
Measuring mode	RMS, Peak to peak, Peak



Ampmeter

Non-Invasive Current Sensor 200A

The split-core, non-invasive current transformer sensor measures current from alternating current (AC). It is used with the Relay node.

Specifications

Input Current	0 - 200A AC
Measuring mode	RMS, Peak to peak, Peak



Float/Limit Switch

Dry contact monitoring/counter

The float/limit switches are an add-on to the Relay node. It can detect the switch state or it can be used as a counter.

Specifications

Type	Any dry contacts
Mode	State or Counter



Butterfly Valve

Slow closing butterfly valve

Slow closing butterfly valve to be used with the Relay node.

Specifications

Diameter	2 in
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Water Counter

Paddlewheel water counter

This SS paddlewheel water counter is an add-on to the Relay node. Water consumption is read off the face of the meter and on the Smartrek Logger.

Specifications

Diameter	3/4", 1", 1 1/2", 2"
Accuracy	5 %
Minimum reading	0.0035 pi ³

SMARTREK PLUG N' PLAY

MONITORING & AUTOMATION



Tensiometer

Soil Matrix Potential (includes transducer and cable)

The tensiometer sensor features a pressure sensor in a stainless steel body with a NPT 1/4" port that fits most tensiometer models in the market, such as the Irrrometer tensiometer. The pressure transducer measures from 0 – 100 cbar vacuum.

Specifications	
Power	3x D-cell alkaline batteries
Pressure range	0 to 100 cbar vacuum
Compensation	Temperature (internal), barometric (external)



Tensiometer

NPT 1/4" tensiometer

The Tensiometer transducer is compatible with all tensiometers with a NPT 1/4" pressure port (standard for analogic manometers).

Specifications	
Compatible brands	Irrrometer, etc.



Soil VWC 5TM

Soil Volumetric Water Content

The 5TM sensor is an accurate volumetric water content sensor using Decagon's technology. The sensor determines VWC by measuring the dielectric constant of the soil using capacitance/frequency domain technology.

Specifications	
Power	3x D-cell alkaline batteries
Dielectric permittivity	±1% from 1 ... 40 (soil range), ±15% from 40 ... 80
VWC (Topp)	±3 in mineral soils, ±2 in porous medium



Water Potential MPS6

Water potential sensor

The MPS-6 is a matric water potential sensor that provides long term, maintenance free soil water potential and temperature readings without sensitivity to salts.

Specifications

Power	3x D-cell alkaline batteries
Range	From field capacity to air dry
Accuracy	±3 10% + 2 kPa from -9 ... 100 kPa
Resolution	Soil Water Potential: 0.1 kPa, Temp. 0.1 C



Watermark

Soil water tension sensor

The Watermark soil tension sensor is used to monitor soil tension up to 200 cBar. The sensor monitors up to 3x Watermark probes. The sensors are temperature compensated using a PT-100 RTD temperature sensor that is inserted into the soil.

Specifications

Power	3x D-cell alkaline batteries
Measuring range	0 to 200 cbar
Compensation	Temperature, with a PT-100 probe



Watermark sensor

Soil water tension resistive sensor

The Watermark sensor is a solid-state electrical resistance sensing device.

Specifications

Range	0 to 200 cbar
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SMARTREK PLUG N' PLAY

MONITORING & AUTOMATION



Flowmeter

Flow and volume monitoring

The Flowmeter sensor can connect to any flowmeter that can provide a passive pulse output with signal conditioning. It is compatible with virtually any flowmeter types and measures both flow and total volume.

Specifications

Compatibility	Any flowmeters with conditioned passive pulse
Input requirement	1 Hz < Fosc < 100 kHz
Power	3x D-cell alkaline batteries



Paddlewheel Flowmeter

Paddlewheel PVC flowmeter

PVC paddlewheel flowmeter with ultra-lightweight impeller and solid state sensing electronics.

Specifications

Diameter	1", 1 1/2", 2"
Flow range	0.25 to 15 FPS
Pressure rating	240 psi max. working p.



Magmeter

Battery powered magmeter

Battery powered in-line magmeter with pulse output and non-resettable totalizer. Batch volume is resettable. Bidirectional flow reading.

Specifications

Diameter	3" to 12"
Battery operation	Yes
Accuracy	±1%



Dissolved Oxygen D.O.

Dissolved Oxygen

The Dissolved Oxygen sensor measures dissolved oxygen levels in a solution. It supports any galvanic probe and can be used to monitor the oxygen content in a water-based media. The measurements are temperature, pressure and salinity compensated.

Specifications

Power	3x D-cell alkaline batteries
Temperature compensation	0 ... 80 C
Accuracy	±0.05 mg/L



Oxydo-Reduction Potential O.R.P.

Oxydation/Reduction Potential

The ORP sensor measures the electrical potential in a solution. It is compatible with any O.R.P. probe brand and can be used to monitor water quality.

Specifications

Power	3x D-cell alkaline batteries
Temperature compensation	0 ... 80 C
Accuracy	±1 mV



pH

Potential of Hydrogen

The pH sensor measures the Hydrogen potential in a solution. It is compatible with any pH probe and can be used to monitor the hydrogen ions activity in water-based media.

Specifications

Power	3x D-cell alkaline batteries
Temperature compensation	0 ... 80 C
Accuracy	±0.002

SMARTREK PLUG N' PLAY

MONITORING & AUTOMATION



Conductivity

Electrical conductivity

The Conductivity sensor measures the electrical conductivity in a solution, along with total dissolved solids, salinity and specific gravity. It is compatible with any K 0.1-10 conductivity probes.

Specifications

Power	3x D-cell alkaline batteries
Temperature compensation	0 ... 80 C
Accuracy	2%



Conductivity Probe

Conductivity submersible probe

The electrical conductivity probe measures the electrical conductivity of a solution. It is commonly used in hydroponics, aquaculture, and freshwater systems.

Specifications

Types	K 0.1/1.0/10
Conductivity	0.07 uS ... 1 S
TDS	0.04 ... 325 000 ppm
Salinity	0 ... 42.00 psu
Specific gravity	1.000 ... 1.300



Oxydo-Reduction Potential Probe

O.R.P. submersible probe

The oxidation/reduction potential probe is used with the ORP node. It measures electron activity in a liquid.

Specifications

Range	±2000 mV
Response time	95% in 1 s
Max pressure	100 psi



pH Probe

pH submersible probe

The pH (potential of Hydrogen) probe is used with the pH node and measures the hydrogen ion activity in a liquid.

Specifications

Range	0 ... 14
Resolution	±1 0.0001
Response time	95% in 1 s



Dissolved Oxygen Probe

D.O. submersible probe

The galvanic dissolved oxygen probe is used with the Dissolved Oxygen node.

Specifications

Dissolved Oxygen	0 ... 100 mg/L
Percent saturation	0.1 ... 400 % sat.
Response time	~0.3 mg/L/sec



Refractometer

In-line process refractometer

The in-line process refractometer monitors concentration of various liquids in real time.

Specifications

Range	0-33 Brix/ 0-80 Brix
Process temperature	-30 ... 150 C
Accuracy	±0.5% (0-33 Brix)/ ±0.1% (0-80 Brix)

SMARTREK PLUG N' PLAY

MONITORING & AUTOMATION



Thermometer RTD

Temperature monitoring

The thermometer RTD sensor is a precision temperature sensor equipped with a PT-100 RTD probe.

Specifications

Power	3x D-cell alkaline batteries
Sensor type	Resistance temperature detector RTD



PT100 RTD probe

Temperature probe

The Pt-100 RTD probe is used with the Thermometer RTD node.

Specifications

Operating temp.	-200 ... 550 C
Accuracy	±0.5C @ -10 ... 85C
Type	3-wires/4-wires
Connector	M12



Thermocouple

Temperature monitoring

The Thermocouple sensor is a precision high temperature sensor equipped with a type K thermocouple probe.

Specifications

Power	3x D-cell alkaline batteries
Sensor type	Thermocouple type K



★
WHITE LABEL

YOUR BRAND, OUR TECHNOLOGY

LEVERAGE EXISTING AND PROVEN SOLUTIONS

Our turnkey monitoring solution can be branded as your own and resold. Developing your own solution from scratch is extremely time and resource intensive. Why not save time and money by leveraging an existing and proven platform.







POWERFUL Softwares

For the Smartrek Plug-n'-Play Monitoring & Automation Ecosystem

SOFTWARES

FOR SMARTREK PLUG-N'-PLAY SYSTEM



Mobile App

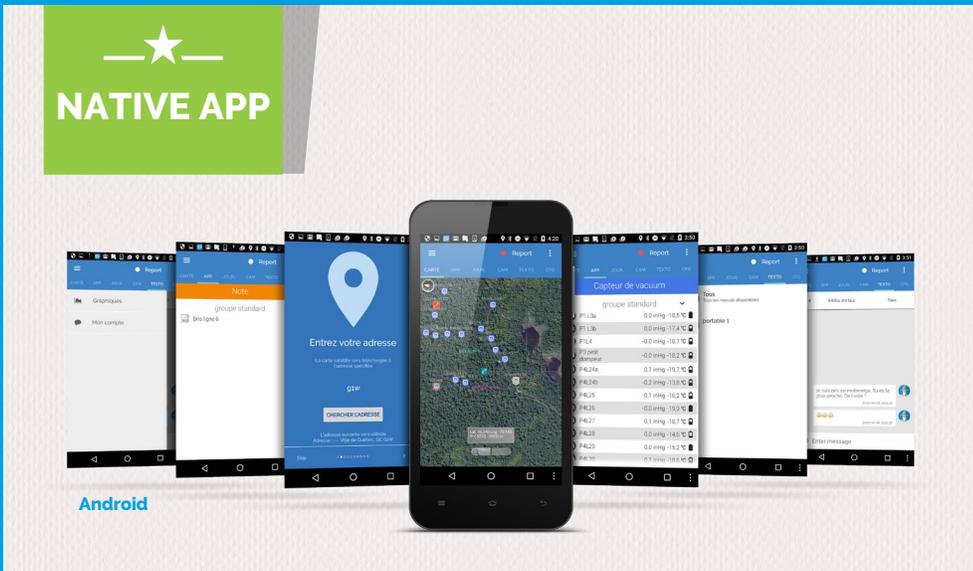
Android Monitoring App

SMARTREK MONITORING is tailored for WSN deployments from basic to the most challenging locations, and is designed with smooth end-user experience in mind.

Plug-n'-play sensors connect to the system via a one-step installation procedure involving a simple QR-code scan from the provided App. Data can then be accessed using from the Smartrek App and the Web 2.0 App.

Smartrek App

- Easy installation by the user
- Native Android App
- Alarms with customizable thresholds



Software features

Features

Data-logging	Yes, Stored on device
Analytical tools	Charts, tables
Alarms	Customizable
Control/automation	Yes, Customizable
Intranetwork SMS	Yes
Roaming	Yes, with internet
Subscription	No. No internet required
Cloud	Yes, On free Google Cloud
Forwarding	Yes, Optional



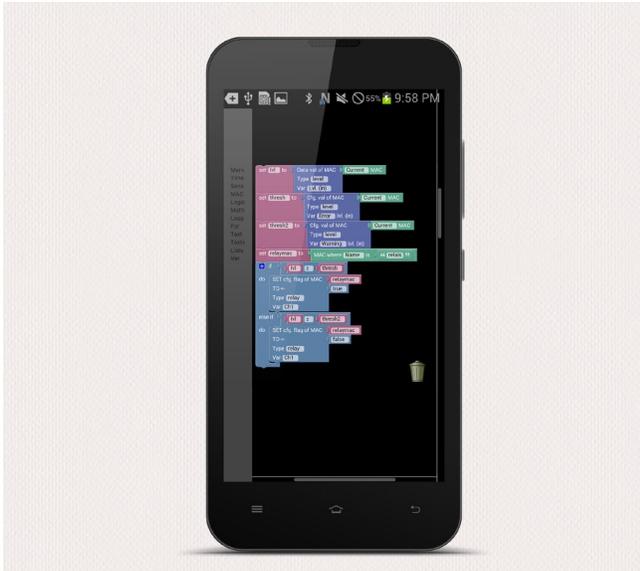
Smartrek App device compatibility:

Samsung Tab A, Tab E, Tab E LTE, S4, S5, S6, S7
Nvidia Shield K1
Lenovo Yoga Tab Pro
Nexus 10

Minimal requirements:

Android OS 4.0+ (ICS, Ice Cream Sandwich)
Bluetooth 2.0+, Wifi
Camera
microSD card, SIM card slot (recommended)





Block Programming

In-app customization and automation

The Smartrek application provides a block programming tool, integrated into the user interface. Customize and automate simply by dragging and dropping blocks onto the workspace, to create your own algorithm.

Example: activate a pump if the measured water level of a tank is higher than a certain value and water level at a second tank is lower than a minimum level.

In-app customizable block programming

- Process automation
- Custom features

Smartrek App	Web 2.0 App (optional)
Local disk, export to .csv files	N/A
Stripping statistics, history	Charts, history, differential
Push, Sound/speech/email/SMS	Customizable, Sound/speech
Form Block/Js programming	Yes, not customizable
Yes	N/A
With network interaction	Available on any browser (Chrome)
Wi-Fi/cellular required. Standalone	No. Internet required
Google Drive, Dropbox services	N/A
Data forwarding using SFTP	N/A



Web App browser compatibility



Chrome.

Not compatible with IE Explorer, Edge, Safari, Firefox



SPIDERMES Case Study

Smartrek SpiderMesh products and services help you deploy and manage critical connectivity that works under the most demanding conditions

H udies



MAPLE SAP FARM

MONITORING & AUTOMATION

Maple syrup is a natural sweetener and a delicacy produced in northeastern North America. During springtime, Mother Nature’s freeze and thaw cycles push water through maple trees, producing a large amount of sweet sap that is collected and boiled down to obtain pure syrup. Harvesting was traditionally done using buckets hanging down a spout hammered into the tree. Nowadays, producers have replaced these buckets by a large network of tubing running through the sugar orchard. The maple sap is then vacuumed from the trees during the sugaring season.



Smartrek Monitoring System has been installed in a maple bush in northern Maine. Miles of tubing run into the woods from tree to tree, each to be vacuumed by seven pumping stations scattered over 385 acres of unorganized land. In such a remote location, making a standard monitoring system cost-effective is hardly envisionable. First, there is no cellular network available, making it impossible to send vacuum data directly to the internet. Furthermore, the network size has to be rather large, by wireless mesh standards, with 85 end of lines under canopy to monitor on a hilly terrain. That’s foliage and terrain blockage all in one.

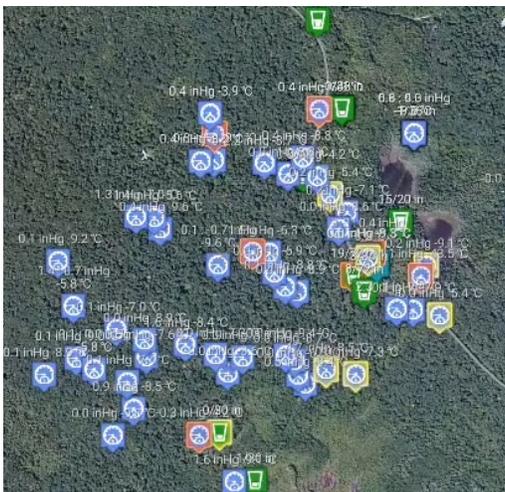
The deployed monitoring system was thus a perfect match for that industry. With the extremely low power Spidermesh technology, sensors operated on 3x D-cell alkaline batteries, requiring no solar panel, could operate for years at a time. And the scalability of the network allowed all 85+ monitors to be connected to the same radio network without using any outside services (such as Wifi, internet, cellular). Moreover, standard services such as text messages could piggyback thru the same mesh network for added-value.

Several parameters were monitored on-site, including telemetry for discharge pressure and tank levels. Pumping equipment were also connected to the system for remote controlling. 5 sniffers were also carried around by workers, which were intended for roaming inside the network to allow workers to target the leaks while in the field and to assess the effectiveness of the tubing repairs, as well as allowing monitoring of worker activities on a location basis throughout the day.

SpiderMesh benefits

The wireless mesh technology was proven to be very reliable in this very harsh environment, with high RF occlusion from both ground and vegetation. While typically, the link range between two sensors is as high as 10-kilometres in direct line of sight, this range was severely reduced to 500-meters in dense deciduous forest conditions. As a result, communication paths to the gateway are often indirect and can only be achieved by hopping from one sensor to another through multiple paths.

Redundancy of messages flooded into the network at periodic intervals ensured timely delivery of the data packet. This type of WSN (wireless sensors network) relies on the nodes themselves, extending the network which removes the necessity to install specialized high gain antennas. As a result, the installation and maintenance cost was significantly reduced.



Benefits of the SpiderMesh Cooperative Mesh Technology	
Battery operation on 3x D-cell alkaline batteries with 5 years autonomy	No solar panels
	No specialized high gain antennas
	One network connecting all sensors
	Real-time data acquisition
	Reliability in high occlusion settings

GROUNDWATER

MONITORING

Some 2.78 million trillion gallons of groundwater, 30.1 percent of the world's freshwater, are estimated for the planet. It is a significant water supply source and provides drinking water for much of the world's population. In a time when population growth, economic development and urbanization pressure water resources, groundwater monitoring has become a necessity. Equipment were also connected to the system for remote controlling. 5 sniffers were also carried around by workers, which were intended for roaming inside the network to allow workers to target the leaks while in the field and to assess the effectiveness of the tubing repairs, as well as allowing monitoring of worker activities on a location basis throughout the day.



Smartrek Monitoring System has been installed on the Eglinton Crosstown LRT construction site. The Crosstown LRT construction is part of the largest infrastructure investment in Ontario's (Canada) history. Once constructed, it will run across Eglinton Avenue, in the heart of Toronto city, on a 19-kilometre corridor that include a 10-kilometre underground portion and 25 stations.

Typically, groundwater monitoring involves drilling a well to access the aquifer. Sensors are then lowered into the well to measure the water level and quality. Smartrek Monitoring solution offers a permanent wireless monitoring installation for long-term well monitoring. As it is extremely low power and can communicate from remote locations, it provides reliable real-time measurements in rugged environments that can be posted directly to the Cloud.

The deployment involves Smartrek Plug-and-Play sensors to monitor multiple parameters of the critical dewatering process. As the city of Toronto is sitting on an unstable sandy soil, groundwater has to be removed adequately to prevent any water infiltration which would result in a ground collapse. Vacuum pumps are running 24/7 and the



aquifers are being monitored closely by several teams around the globe.

Vacuum sensors were installed on the pumping lines to monitor the dewatering operation, current sensors were placed on electrical panels to monitor pump failure. Flowmeters were also installed to keep track of the water being removed, temperature sensors were deployed to prevent freezing lines during the cold Canadian winter. Water level sensors were dropped into several wells to make sure that the groundwater level was below the tunnels being constructed. Overall, more than 200 sensors were deployed on the Eglinton Crosstown line.

Real-time data was gathered using the Spidermesh cooperative mesh technology, to the main gateway where data was being logged and then sent to the Cloud. Several sensors were monitoring underground, in the tunnels and connected to the Spidermesh

network, at the surface, through the ventilation shafts.

Data was analyzed on a daily basis, by the workers on-site and by several engineering teams throughout the world, using the software provided with the monitoring system. Additionally, with the tools provided, reports were generated including the logged data and charts of the dewatering process.

Using the Smartrek Monitoring System, the level of management efficiency was significantly increased as it eased collaboration from multiple teams. Real-time monitoring on the construction site help prevent critical failure that can endanger workers and incur significant delays and costs.



Product
CATALOG

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