Myconi Technical Solutions for In-Transit Cold Chain Logistics

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ABSTRACT

This innovative wireless monitoring solution will provide In Transit Visibility (ITV) and Total Asset Visibility (TAV) and material condition reporting throughout the Cold-Chain distribution system for perishable, temperature sensitive and high priority cargos, providing situational awareness and accountability information to cargo owners.

In accordance with BUMEDINST 3500.5 [i], 5450.1H [ii] and 6230.15B [iii], this capability will assist in ensuring the delivery of viable vaccines/pharamaceuticals in quantity and provide historical data logging to identify any significant environmental/material condition variation events.

1 BACKGROUND

Myconi Technologies has developed a proprietary wireless, ad hoc, peer-to-peer, self-healing mesh network protocol using the IEEE 802.15.4 standard and operates on the internationally license-free ISM 2.4GHz bandwidth. Myconi has incorporated their wireless technology with ultra-low powered mobile monitoring devices and multiple MEMS environmental sensors for wirelessly monitoring temperature sensitive cargo that is transported through global distribution systems (land, sea and air). This secure TRL 8 (Technology Readiness Level 8) system is comprised of 5 different wireless monitoring devices (with optional probes), 3 wireless gateway configurations, and includes a secure internet-based data management platform.

2 APPLICATIONS

The Myconi monitoring solution is particularly designed for Total Asset Visibility for all cargo that is sensitive to temperature, humidity, light, harsh handling and geo-locational challenges. Industries and applications involved with the storage and transportation of vaccines and serums, pharmaceutical products and equipment, processed and perishable foods and even HAZMAT all require their products to be actively monitored on a 24/7 basis, and should any exception event occur, an alert message should immediately be forwarded to the relevant people.

And when an alert occurs, remedial action can be implemented to ensure that future exceptions do not occur, and is used for accountability purposes as well.

Still further applications can be incorprated for Intermodal Containers and the contents thereof, and can assist the DHS at the Border Control Posts to improve the processing of every container entering the USA.

The FDA's DSCSA [iv] regulation and FSMA [v] have implemented new serialization coding regulations that will be applicable to all pharmaceutical products and food products from November 2018. The Myconi solution can assist users to conform to these latest FDA regulations.

3 METHOD OF OPERATION

The most compact Myconi monitoring device (the Myconi MB Tag) is like a Fit-bit and is placed into boxes of products that require constant monitoring.

The device is easily configured by the shipper and based on the type of product being shipped, predetermined thresshold limits for various environmental conditions are automatically downloaded over-the-air to the device. The device immediately begins logging and storing sensor data and will only transmit data at pre-selected intervals, and in the event of an exception occurring.

Should an exception occur, an alert message is immediately transmitted to users by email or text to notify them of when, where, why and how the exception occurred.

The Myconi Mesh technolgy enables each device to determine its own optimal data transmission path to the gateway which then forwards the data onto the internet based Data Management Platform.

Myconi Gateways can function as either "fixed gateways" (for warehouses or marshalling yards), or "mobile gateways" for trailers, containers, aircraft, trains, pallets etc.

Myconi networks can function with a single gateway, but for ultimate redundancy and latency, multiple gateways can function in a single network.

Myconi monitoring devices can move freely between fixed and mobile networks from anywhere in the world.

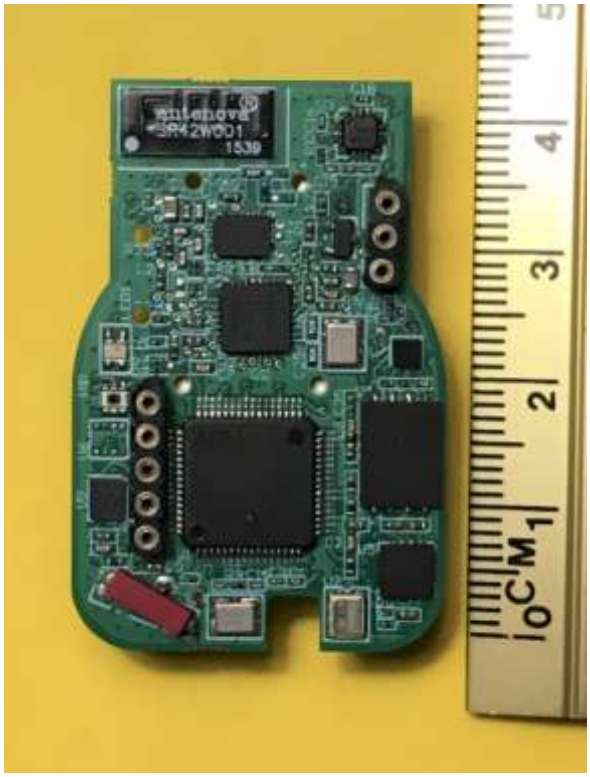
4 FEATURES AND BENEFITS

The Myconi mesh network architecture consists of many unique features that are important for mobile monitoring applications, such as:

- All stored and transmitted data is fully encrypted to 256 bit AES standard
- The networks are highly scalable allowing for millions of devices to exist in any network.
- Optimal data path with built-in redundancy ensures the transmission of all sensor data even if one device fails, or is removed.
- Ultra-low power circuitry enables constant monitoring for more than 6 months.
- If a device and a moble gateway move in unison on the same platform, an association is formed (patented).
- While the monitoring tags do not have GPS, the location is derived from the GPS within the associated gateway (patented).
- Multiple MEMS sensor probes can be connected to a single monitoring devie (patented)

5 MYCONI MB TAG

The Myconi MB Tag is the most compact wireless monitoring device available and constantly monitors environmental conditions with a battery life of greater than 6 months.



6 INTELLECTUAL PROPERTY

In order to protect the Myconi technology that is incorporated into the monitoring solution, several utility patents have been obtained as follows:

- Patent US 9,059,906: Data Communications interface
- Patent South Africa 2015/04550: Barcode ID for portable device
- Patent US 9,628,876: Network & method for associating a mobile monitoring device in a network based on comparison of data
- Patent US 9,133,019: Sensor Probe & related systems
- Patent US 9,832,547: Association functionality in a mobile monitoring device for continual remote monitoring
- Patent US 9,942,629: MEMS Sensor Probe multiplexer

Several other published patents in the USA and Germany are pending.

7 CONCLUSION

The need for Cold Chain management for a variety of products has existed for many years and industry has used manual temperature data loggers. These loggers in reality are ineffective mainly because they are unable to provide real-time alerts and the sensor data has to be manually uploaded at the end of every shipment, which is labor intensive and can lead to human errors.

With the advancement of electronics and wireless M2M technologies, it is now possible to provide continual monitoring from A to Z throughout the entire Cold Chain process and provide real-time exception reports to assist in the reduction of compromised products, and potentially saving industry billions of dollars.

REFERENCES

[i]http://www.med.navy.mil/directives/ExternalDirectives/3500.5.pdf

[ii]http://www.med.navy.mil/directives/ExternalDirectives/5450.1H.pdf

[iii]http://www.med.navy.mil/directives/ExternalDirectives/6230.15B.pdf

[iv]https://www.fda.gov/Drugs/DrugSafety/DrugIntegrityandSupplyChainSecurity/DrugSupplyChainSecurityAct/

[v]https://www.fda.gov/Food/GuidanceRegulation/FSMA/default.htm