FREEWAVE

Data Is Everywhere

Leveraging Fusion™ Satellite to Connect and Collect Critical IoT Data

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Having access to data in today's environments can make the difference between making business decisions based on half the information you need or making the best business decisions based on critical information. Until recently, connecting remote or hard to reach devices relied on limited connectivity options. With the expansion and innovation in satellite, the option to connect these remote devices to the larger systems is now not only available, but also cost-effective.

FreeWave has been designing network connectivity devices and platforms for the IOT space for nearly three decades. Adding Fusion™ Satellite – the powerful Gateway device that utilizes a satellite modem for global connectivity – allows for global connectivity at the lowest data and service cost on the market.

This finally makes satellite connectivity affordable for organizations with large numbers of remote assets.

In this paper you'll learn how a system manager can implement solutions from FreeWave Technologies into their network easily and effectively allowing them access to all the data they need to make the best decision possible. No matter what industry – water, energy, or agriculture to maritime, and more, leveraging satellite can simplify connecting remote assets.

An Overview of Fusion Satellite

Fusion Satellite is the third solution in the Fusion portfolio purpose built and designed for optimally connecting to IoT data devices. Creatively, we designed it to also implement our FreeWave Edge™ software with protocol converters to make it a drop-in solution to connect existing SCADA equipment.

This means, if a machine is running a protocol like Modbus, for example, the Fusion Satellite device can be quickly and easily configured to not only connect that equipment to a satellite network but give the user a set of data management tools to custom tailor what data is sent, and when.

The Fusion Satellite is also GPS-enabled, making it much more than a simple GPS tracking device. It is also two-way communication, supporting applications that receive as well as send, allowing command and control of very remote assets.

And finally, it includes data management and cloud storage utilities that make it easy for customers to consume their data into from each unique operational system.

This brings a lot of connectivity power to industries and operations that previously couldn't consider a satellite connection for their equipment.

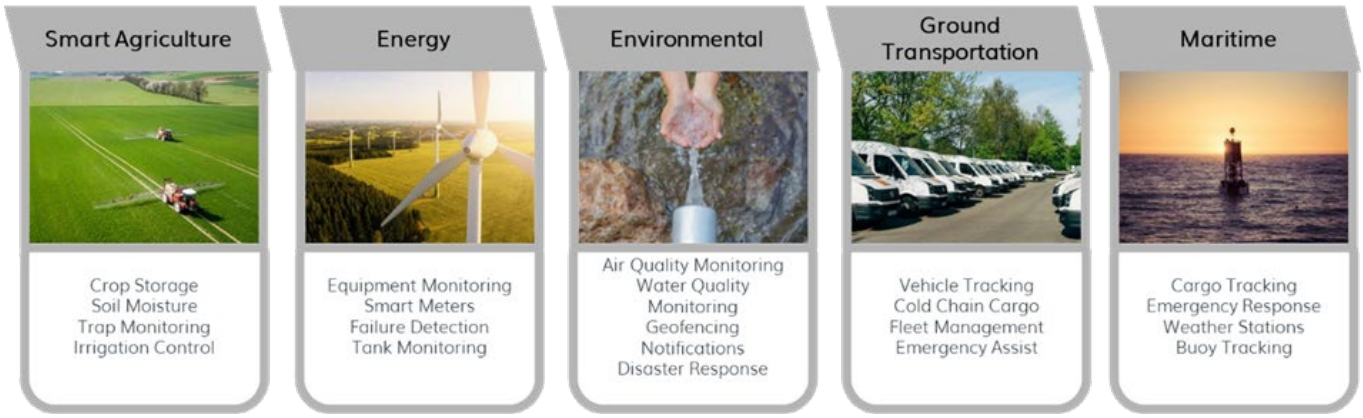


Figure 1: A Variety of Industries for Fusion Satellite

Modularity With Broad Value

When designing this product, it was an easy exercise to identify a variety of use cases for a wide range of industries.

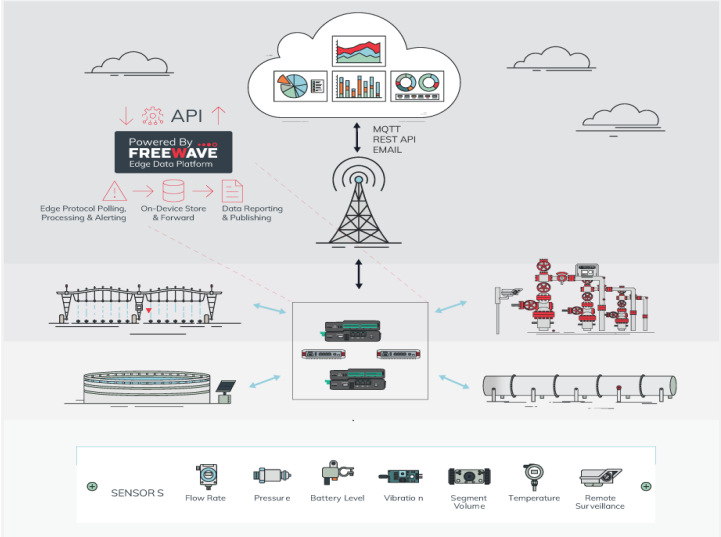
Agriculture operations live and die on the efficient operation of a multitude of assets. Not just mobile equipment like tractors and combines, but other assets like storage facilities, crop health monitors, irrigation controls, and the like.

In the Energy industry: whether we're talking about renewables, oil & gas, or utilities, there are endless monitors, meters, and detectors in every operation that need to be connected and are often too remote for conventional IoT solutions.

This is a similar problem faced by many environmental applications, where the monitoring of air, water, or weather takes place in very remote environments.

Ground Transportation and Logistics organizations are always looking to better monitor and track their vehicles and cargo but are currently prevented from connecting these assets by the high service costs offered by current satellite solutions.

And finally, nothing is more remote than Maritime applications. Fusion Satellite can offer a significant cost reduction to organizations needing to communicate with any cargo or assets at sea.



FreeWave Edge extends sensor connectivity and data collection to all of the equipment in a system. It provides a single-source for connectivity and data collection in one box – with options to collect that data based on your needs. That means you get faster, more reliable data no matter the protocols used – Bluetooth, Modbus, ROC or Totalflow.

Solutions to Span Needs

Fusion Satellite is ideal for applications that call for connecting assets, static or mobile, that need to regularly report readings or status information.

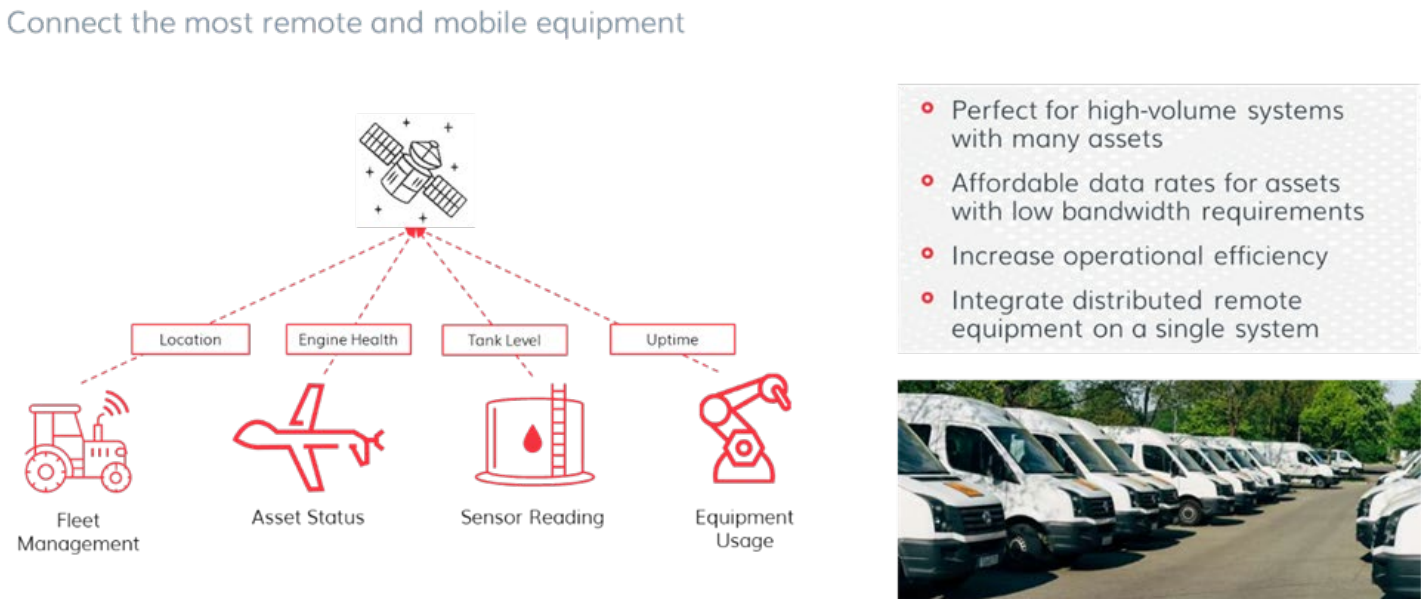


Figure 2: Various Applications to Connect

For example, a remote storage tank reporting its fluid level once an hour, or a machine reporting its on/off status and total uptime. In operations with a high number of assets like these, this data can be invaluable for increasing operational efficiency. The low cost of the Fusion Satellite connectivity service can remove that financial barrier to connecting these assets, improving efficiency, and giving customers full control of assets.

And, with the data storage and cloud services that are included with this product, customers can bring data from all kinds of different equipment into a single platform for easy manageability.

Solutions for Agriculture

The Fusion Satellite is also ideal for implementations requiring two-way communication for simple command and control. For example, as shown in Figure 3 pivot irrigators utilize multiple sensors and actuators to efficiently deliver water to crops. The sensors report the current state of the equipment and its environment, and the actuators control the physical operation of the machine. This equipment is often remote, presenting challenges for connectivity. And because it only needs to send a small amount of data something like a high-bandwidth cellular solution is expensive overkill for the requirements.

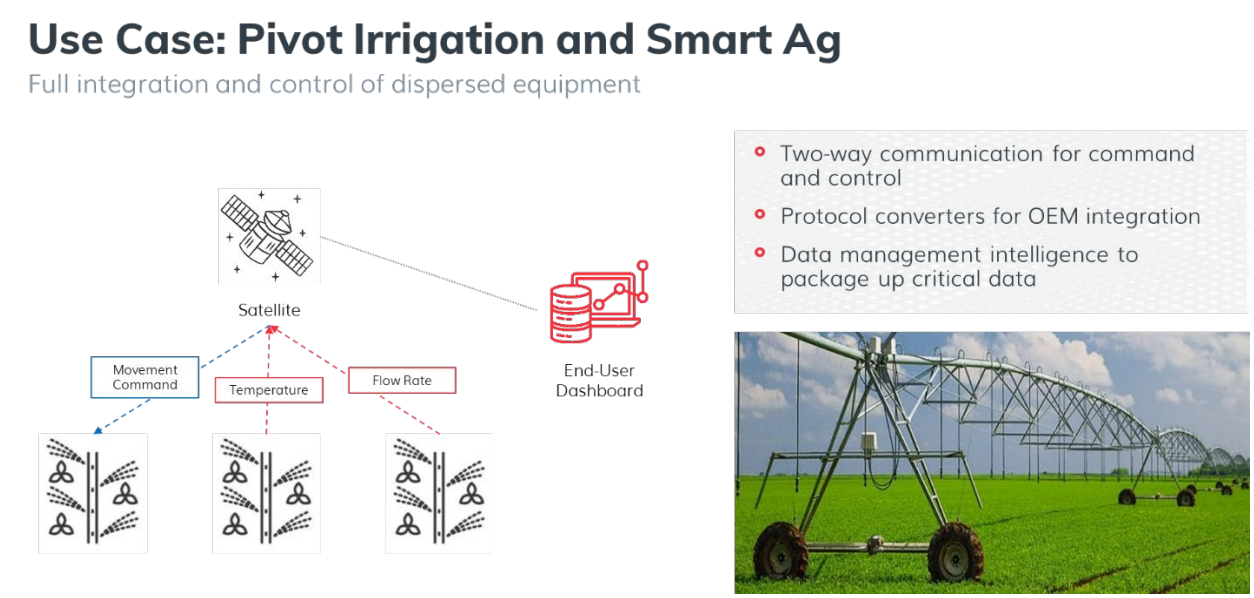


Figure 3: Smart Agriculture Benefits from Satellite

This is a perfect application for the Fusion Satellite, the device can ingest and communicate sensor data, as well as accept commands from the remote end user or system, and it is never out of range. Using a satellite connection means that the communication system does not require an on-premises gateway connection to be connected. The equipment communication system can be self-contained while being monitored and controlled from anywhere in the world.

This use case also highlights another valuable feature of the Fusion Satellite: the easy OEM integration. For example, if this pivot irrigation equipment is an existing system running on a proprietary protocol, it is very challenging to integrate an off-the-shelf communication component into that system – the devices won't speak the same language. Because of this, many companies are forced to build a bespoke solution, adding cost to the development and maintenance of their system, cost which ultimately increases the price to the customer.

But unlike other third-party solutions, the Fusion Satellite is designed to be easily incorporated into OEM systems. OEMs have the option of running their own custom software on the device to integrate it into their system, or alternatively, FreeWave will work with the customer or the integrator to develop the protocol converter that will allow the Fusion Satellite device to integrate natively into the customer's system.

And finally, we've already mentioned that the Fusion Satellite has GPS features for location tracking applications, but when paired with the ability to send sensor data along with location information, the satellite connection shows its true value.

Solutions for Transportation and Supply Chain Tracking

This use case utilizes the Fusion Satellite for tracking Cold Chain storage assets – goods that need to be kept refrigerated from the plant to the consumer. If at any point in the logistics chain the product goes above a certain

temperature, it could become tainted, and become a hazard to the consumer, and by extension, a huge liability for the producer. At minimum, the ruined product becomes a loss for the producer, so the justification for an always-on tracking and monitoring mechanism comes down to a simple cost decision.

Fusion Satellite provides all the features required to create such a system, at a far lower operating cost than other products on the market. The Fusion Satellite can be configured to monitor the product from plant to consumer, regularly reporting location for operations tracking, and automatically raising an alert if the sensor levels go beyond threshold, catching a temperature problem before the product is ruined, so corrective action can take place as soon as possible.

BREAKING THE BARRIER TO DATA

Full IoT system connectedness has been limited due to

- Assets being too remote, or have changing network environments, as with mobile assets
- Too costly to connect, as is often the case in operations that need to track a larger number of assets.
- Or, in many industrial operations, assets run on an existing system with their own communication and protocol requirements, making it expensive and time-consuming to connect assets to third-party IoT equipment

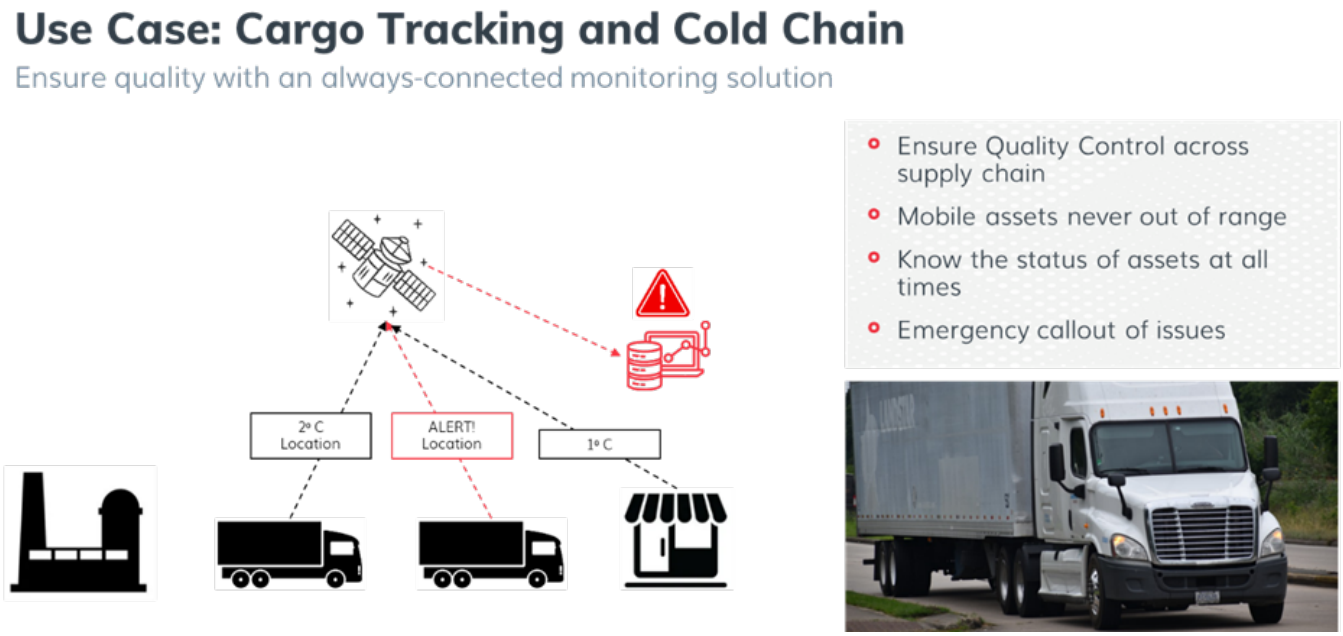


Figure 4: Satellite for Cargo and Cold-Chain

A Platform for Modularity

For nearly 30 years FreeWave has been working with operations to connect businesses to their data with an ecosystem of edge intelligent solutions.

Our multi-communications gateway solutions platform includes edge data analytics and applications.

We've also accelerated our ability to bring fully integrate, plug-and-play IIoT solutions to the market quickly and cost-effectively, in our joint venture with ModuSense.

Figure 5, below, shows the holistic vision for the Fusion product line. The Fusion platform is configurable with up to two radios, both FreeWave built and mass-market radios, with application software to connect to industry standard and generic user equipment. Options for custom compute and I/O capabilities are available, also. The result is a product that can be configured with exact radio technologies, I/O, and compute power to fit the requirements of any IoT system, all with a single form-factor.

The goal of the Fusion platform is to connect all types of industrial equipment, regardless of interface requirements or radio environment, to a single data endpoint. This will allow the end user to create complex networks that can be visualized and controlled through a single pane of glass.

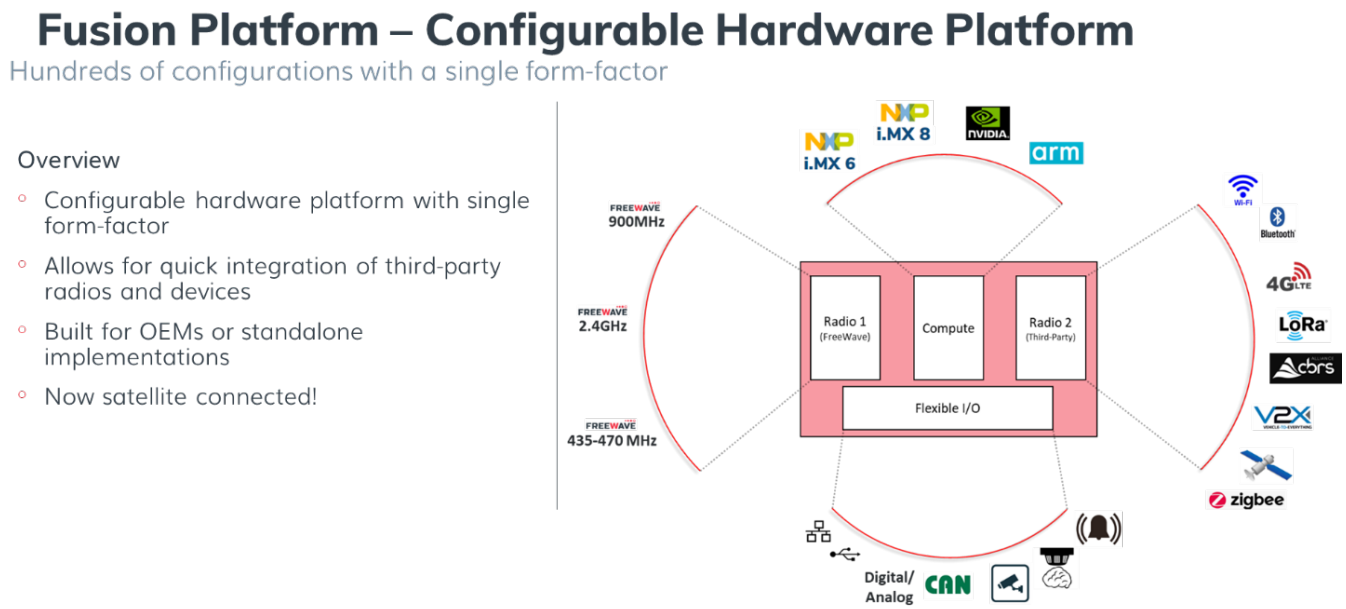


Figure 5: The Fusion Platform Expansion

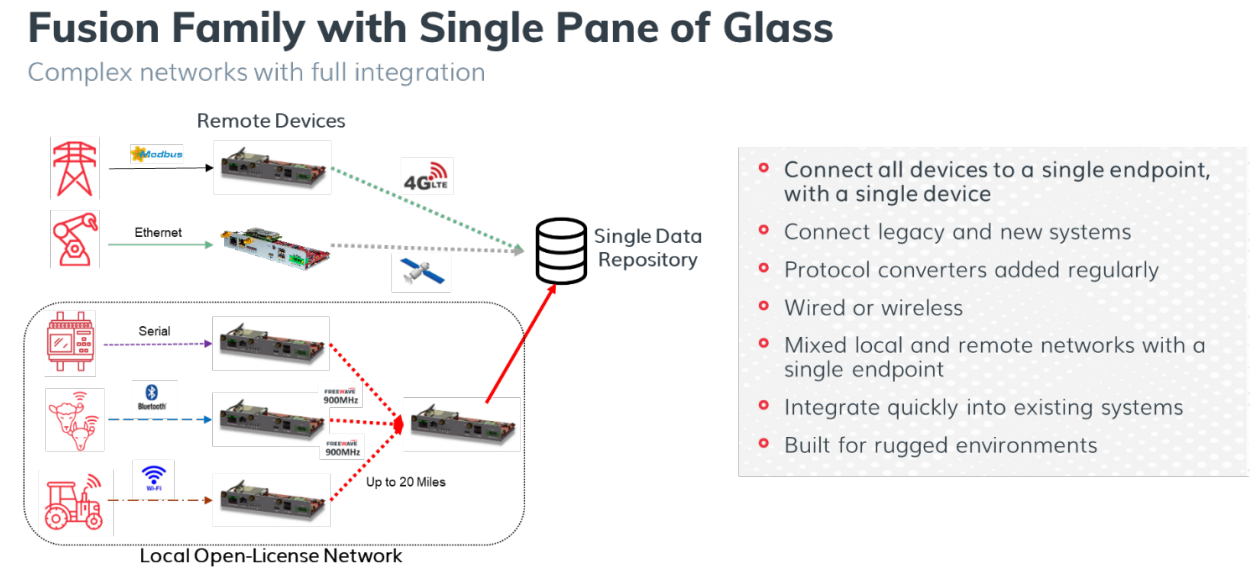


Figure 6: Complexity Simplified into a Single Pane of Glass

Figure 6 shows a diagram example of the kind of complex system achieved with the Fusion platform. On the left, there are various types of assets and equipment, all with their own connectivity needs, wired or wireless, connected to the Fusion platform. Then, the Fusion platform is connected to a northbound radio that meets the specific requirement of the user's environment. On the top we've represented a cellular connection and a satellite connection, and on the bottom a 900MHz local area network, built with the FreeWave Z9 radio.

Even with totally unique I/O and radio requirements for each piece of equipment, the Fusion platform consolidates all data onto a single platform, allowing users to take otherwise complex systems and connect their data on a single cohesive network.

Bringing Your Data Closer, No Matter Where it is

Data keeps moving and we'll continue to expand the options of connectivity so that you get the data you need where and when you need it. We like to say we're bringing your data closer, no matter where you are or where it is. Satellite technology is now within reach and a viable solution for many who have had to make tradeoffs due to environmental, system, or cost prohibitive issues. With FreeWave, you not only get complementary solutions that integrate easily with one another; you get three decades of experience building the right IoT solutions for the job.

If you're interested in learning more about the FreeWave Fusion Satellite solution or other solutions in the FreeWave portfolio, please connect with us at https://freewave.com or send us a message at info@freewave.com. The possibilities are limitless. Your data is closer than you think.

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