

## Product Data Sheet: FlatMesh Wireless Sensor System

### System overview

Whether it be monitoring short or long term track bed twist and cant, embankment slippage, bridge condition, through to tunnel deformation assessment during repair or replacement, Senceive's systems are designed for challenging, wire and power free deployment.

The systems have been deployed over 10 years making Senceive the most experienced wireless RCM provider for Rail and Construction globally. The award winning Senceive solutions use a wireless mesh-networked, intelligent sensor system consisting of a collection of small easy to deploy devices, equipped with sensing, communication and computation capabilities. They work co-operatively and intelligently ("they talk to each other") to enable monitoring of complex layouts or challenging and difficult to access environments.

### Wireless Mesh Networking

At a technical level the system has been tested and proven over a decade of deployments in highly demanding environments, and prior to that 5 years of research at UCL, one of the world's pre-eminent engineering universities. Our System Integration Layer consists of a lightweight operating system and modules that interface between the sensors, communication layers and processing systems on each node and then back through a gateway to our server and web interface.

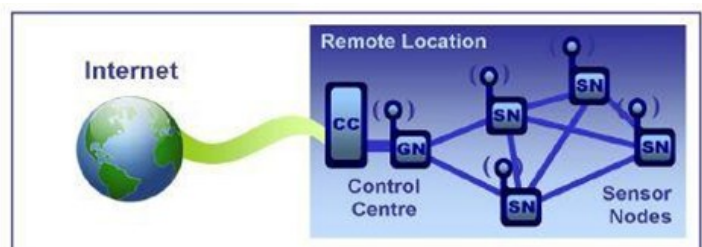
The nodes themselves are micro-controller based, wireless mesh-networked based on IEEE 802.15.4 and form an integrated system that can monitor over a wide area or any convoluted physical/geographical environment. Working as a self-configuring wireless mesh, data moves from neighbour to neighbour through the network. This provides an extremely robust and flexible solution adaptable to many various and challenging situations.

As a result of many years of development on sensor interface and wireless algorithms, battery life is unrivalled and should last between 12 to 15 years in typical situations of 15 minute to one hourly reporting.

Proprietary algorithms support functions such as clustering, data retrieval and policy distribution, self-diagnosis, dynamic algorithm management and security models. Nodes communicate with the gateway in order for data to exit the system. The gateway only needs to communicate with one node in order for the whole network to send data. This provides highly flexible deployment configurations, particularly in comparison to hub and spoke wireless alternatives.

Senceive's gateways comes in a variety of options to ensure data is readily available even before the install team leaves site. The options vary from USB connection to a laptop or industrial PC, connectivity via a solar powered cellular gateway or to a wide choice of networks where some power is available and connections to other data bases, data loggers or industrial PC's are

appropriate. The system is highly intelligent and enables us to interact with nodes and the gateway remotely; via the web it is possible to visualise and manage key elements within the network.



Data is transmitted to our user friendly Webmonitor software or can be sent to customer defined alternative software.

While our proprietary technology is exciting and we are innovating continuously, we only bring the most robust and applicable products and techniques to market.

## Product Range

Senceive's family of mesh-networked sensor units equips companies with the capability of efficiently monitoring their infrastructure. The FlatMesh system gives the Rail and Construction industry a reliable, easy to deploy and cost effective monitoring solution. It needs little installation labour or technical know-how and requires little ongoing support. It is highly flexible and scalable and extra units or sensor types may be added at any time when additional or unforeseen monitoring requirements are presented.

The sensor nodes are readily capable of interfacing with both analogue and digital sensor types and to those providing a simple voltage output.

The range includes tilt and crack sensors and the vibrating wire family of sensors providing a complete solution. It also includes an integrated camera solution that works on a mains power free/solar power, sending images back to our Webmonitor.

Senceive is committed to a continuous program of product development and improvement. As a result, these specifications are subject to change. Final products may be slightly different in appearance.

## FlatMesh System Specifications

Parameter	Value
<b>Communication Type</b>	Proprietary FlatMesh v3 Mesh Networking Protocols IEEE 802.15.4
<b>Frequency Band</b>	2400 – 2485 MHz ISM Band
<b>Maximum Network Size</b>	Typically, up to 110 nodes and multiple applications including cameras Consult with Senceive to determine the optimal system configuration
<b>Range between nodes, node to gateway</b>	Up to 500m