



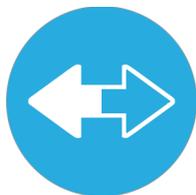
# Technology Stack

## Overview

The SureFi Technology Stack refers to the group of Hardware and Software based product to be developed by the SureFi team. These products are designed to make use of the SureFi Wireless Transport Technology and make it available to third parties for specific applications. The Stack includes 3 major components as well as several ancillary products. The three core components are the SureFi Wireless Module, SureFi Smart Gateway and the SureFi Cloud Services. This document will provide a brief overview of each of these components as well as several cases for implantation of the SureFi Technology Stack.



## SureFi Technology - Concepts



### SureFi Transport Protocol

Sure-Fi Transport Protocol is a wireless technology that has been developed to enable variable data rate communications to be made reliably over long distances. The advantages of using this transport layer include high reliability for low data rate within 1 mile range (with obstructions) or higher data rates within 1000 feet, allowing for hundreds of nodes per gateway, low power and longer battery life.



### SureFi Adaptive Network

SureFi uses an Adaptive Star Network Topology, which extends a standard Star Network Topology. By using multiple SureFi Smart Gateways, an application of a SureFi Network will be able to configure itself to allow for distribution of gateway to endpoint links across the entire network. Instead of an endpoint being assigned to a specific gateway, the SureFi Network will be able to determine the optimal configuration and load balancing endpoints based off several factors including strength of signal, gateway availability and proximity to related devices.

## SureFi Technology - Hardware



### **SureFi Wireless Module**

The SureFi Wireless Module is essentially the Transport Layer for the Technology Stack. The module contains all of the necessary controls to use the RF signal that is transmitted between the nodes or endpoints, i.e. the sensors and the SureFi Smart Gateway where signals are received or between different modules. It governs aspects of the signal including the frequencies, modulation format, power levels, signaling between the transmitting and receiving elements. Access to these controls will be provided through firmware embedded within the module itself. The module can be embedded into third-party applications via a standard Serial Peripheral Interface (SPI).



### **SureFi Smart Gateway**

The SureFi Smart Gateway is the hub of the SureFi Technology Stack. It provides the networking interface between SureFi Wireless Modules and the SureFi Cloud Services. Although the SureFi Smart Gateway is cloud configured, it also contains the Operating System used to manage devices states, communications between endpoints as well as event triggering and scheduling. By maintaining this layer on the SureFi Smart Gateway it allows the gateway and associated endpoints to act independent from the SureFi Cloud Services in case of a loss of connection.

## SureFi Technology - Software



### **SureFi Cloud Services**

The SureFi Cloud Services acts as the Application Interface for the SureFi Network. SureFi Cloud Services provide a way to configure SureFi Smart Gateways within the applications SureFi Network. It allows for the management and addition of endpoints and provides the interface to create endpoint relationships and interactions. The SureFi Cloud provides applications access to API's which allow for integration with third-party cloud services, web platforms and desktop/mobile Apps.



### **SureFi Developer Program**

The SureFi Developer Program is a set of services provided by SureFi to assist in the implantation of a SureFi based Application. The Developer Program provides access to a Web based Graphical User Interface (GUI) for designing, testing and implementing products using SureFi Cloud Services. SureFi will assist in setting up a hardware testing environment where development teams can experience and interact with the SureFi Cloud through the product development cycle.

# SureFi Technology - Application Cases

## Case 1 - Full SureFi Implementation

In this case, the application makes full use of the entire SureFi Technology Stack. Application Endpoints such as light switch, door locks and gate controllers each use a SureFi Wireless Module embedded within the endpoint hardware. The firmware on the endpoints use interfaces into the Modules firmware to make use of the SureFi Transport Protocol and communicate endpoint status to the SureFi Smart Gateway. The Gateway in turn communicates with SureFi Cloud Services for network configuration and optimization. Application specific Apps and Management Software communicates with the SureFi Cloud to allow a User Interface to control and manage Endpoints.



## Case 2 - SureFi Transport and Cloud Services

An application may wish to use a combination of the SureFi Transport Protocol and Cloud Services but maintain their own gateway and network topology. This may be because they use a combination of several transport layers such as WiFi or Bluetooth. In this case, SureFi enabled endpoint will contain the SureFi Wireless Module. The gateway will also need to contain at least one SureFi Wireless Module. The gateway can then communicate with the SureFi Cloud Services using simple API calls. As with Case 1, application specific software can also communicate with the SureFi Cloud.



### Case 3 - SureFi Transport Only

This application simply uses the SureFi Transport Protocol by using the SureFi Wireless Module in both the endpoints and the applications gateway. All other services are provided by the application.



### Case 4 - SureFi Cloud Services Only

This application only uses the SureFi Cloud Services to maintain an interface between an application gateway and User Interface Apps. All other management and services are provided by the application.

