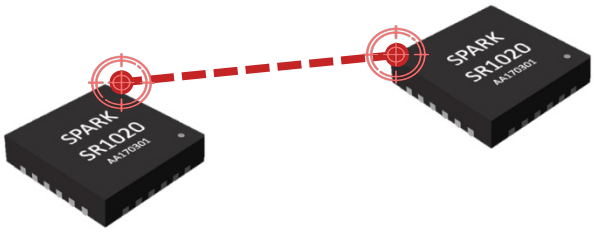
Time-of-Flight Ultra-Wideband Ranging Demo Brief

Ultra-Low Power **Ultra-Short Latency** **Microwatt Battery-less Operation** **Precise Ranging**

About us

SPARK Microsystems offers a unique & innovative wireless transceiver technology that achieves **40x more energy efficiency, 60x lower latency, and 10x more data throughput** as compared to BLE.

The SPARK SR1000 family of ultra-wideband (UWB) transceivers does not interfere with other radios such as WiFi, BLE, Zigbee, Z-Wave and cellular. They also provide very high quality of service connectivity.



Ranging with SPARK

In addition to communicating data, the SR1000 family of UWB transceivers can make accurate distance measurements (i.e., ranging) between two SPARK chips.

This is done by leveraging a unique ultra low power time of flight (ToF) measurement architecture. Time of flight ranging is much more robust than typical ranging methods based on received signal strength as it relies on the time for the RF signal to transit between two chips and it is not affected as much by occlusions between the chips.

SPARK's ranging system provides a 30 cm distance measurement accuracy. The system can operate from 0.5 m up to 100 m in line of sight.

SPARK's technology uniquely allows for microwatt-scale time of flight ranging, opening the door to extended battery life or battery-less (i.e., energy harvested) real-time positioning systems.

A convenient graphical user interface is also available to benchmark the SR1000 transceivers in ranging mode.

Specifications

- Time of flight-based distance measurement
- 30 cm accuracy from 0.5 to 100 m
- Low power ranging
  - 250 µW for continuous ToF ranging measurements every 100 ms.
  - 25 µW for ToF ranging measurements every second
  - 3.5 µW for ToF ranging measurements every 10 seconds
- Obstruction mitigation
- Link statistics with GUI while ranging

SPARK Transceiver Specifications

- Dynamically reconfigurable UWB spectrum with up to 3 GHz of bandwidth
  - SR1010: 3.1 – 5.75 GHz band
  - SR1020: 6 – 9.5 GHz band
  - Up to 10 dBm peak TX power
- Ultra-short latency: 50 µs airtime for 1 kb
- High quality of service
  - Capable of 3 ms audio latency for uncompressed 48 kSps 16-bit stereo 1.53 Mbps audio streaming
- Scalable data rate up to 10 Mbps
- Time of flight-based distance measurement capability
  - 30 cm line of sight accuracy from 0.5 to 100 m
- Ultra-low power consumption
  - Down to 0.25 nJ/bit TX energy efficiency and 1.15 nJ/bit RX energy efficiency
  - Sub-mW TX at 3.1 Mbps and sub-mW RX at 0.8 Mbps
  - Energy efficient operation down to a few kbps
  - 55 nA hibernate, 750 nA deep sleep (w/ synch)
  - 1.7 to 3.6 V supply
- Coexistence and non-interference with BLE / WiFi (2.4 & 5 GHz) and cellular
- 50 m range @ 5.5 Mbps; 100 m range @ 600 Kbps
- Low power/cost timing using a 32.768 kHz XTAL
- Industrial operating range: -40 to +85 °C
- Compact 4 x 4 mm 28 pin QFN
- SPI Interface

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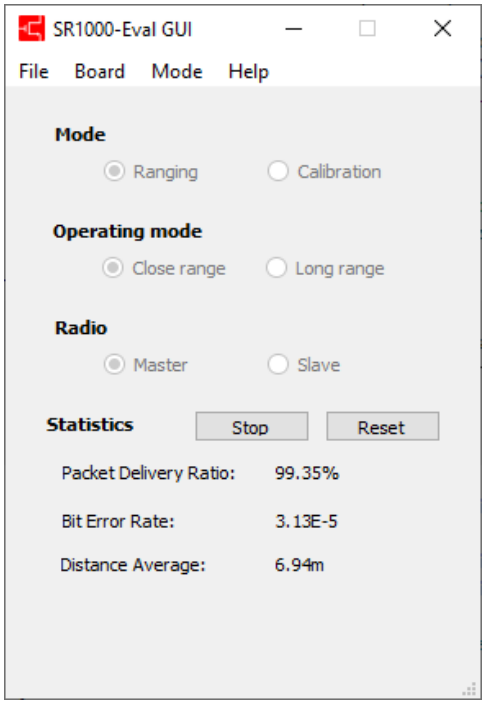
SPARK ranging evaluation kit with on-screen display*



SPARK ranging evaluation kit interface

While using the GUI for ranging, a real-time distance measurement is shown alongside link statistics.

Flexibility

- The SPARK Radio can support device-to-device and star network configurations.
- Depending on the data-rates, the SPARK Radio can multiplex hundreds of users / devices in the same space (e.g., beacons, tags, etc).

Applications

- Indoor positioning systems
- Asset tracking systems
- Remote keyless entry systems
- Wireless payment systems
- Robotics

*Currently supports only point-to-point ranging. Multi-point ranging for trilateration to be released in Q1 2020.

About SPARK Microsystems

SPARK Microsystems is a fabless semiconductor company that is leading the way towards ultra-low power wireless communications for the Internet of Things revolution. With its patented technologies, SPARK Microsystems is bringing to market a high performance wireless transceiver that allows for orders of magnitude improved power consumption and latency while providing higher data rates than competing technologies. For more information, please visit www.sparkmicro.com.

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