



# Get cellular IoT products to market faster with the Skywire Nano

Nordic Partner Webinar

November 2020

# Today's speakers

Petter Myhre



Head of Product  
Marketing



Brandon Hart



Director, Technical Business  
Development



# Who am I?

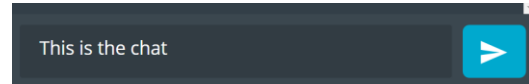
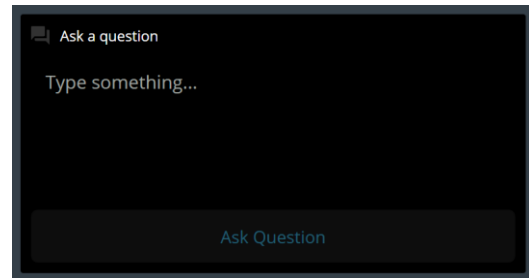


- Brandon Hart
- Technical Marketing
- From the Workshop
- ~20 years of experience
- Beard Grower



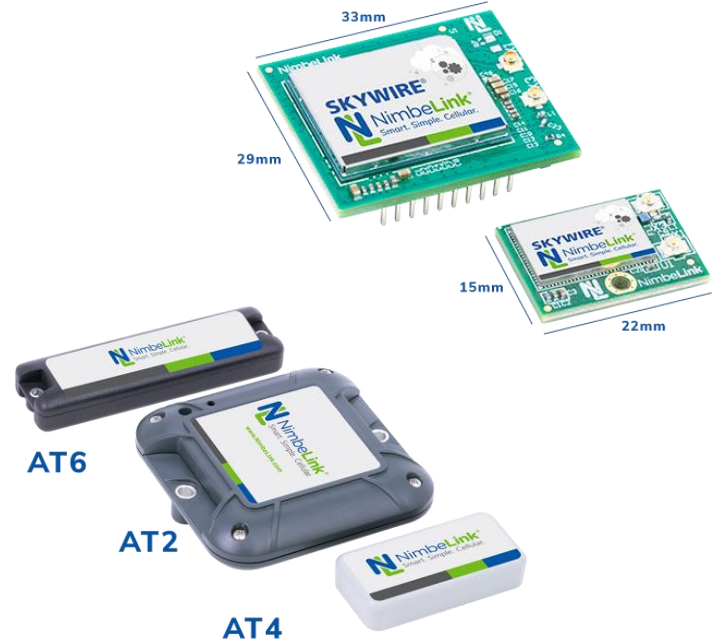
# Practicalities

- Duration: 50-60 mins
- Questions are encouraged!
  - Please type questions in the top of the right sidebar
  - All questions are anonymous
  - Try to keep them relevant to the topic
  - We will answer them towards the end
- The chat is not anonymous, and should **not** be used for questions
- If you have more questions:
  - DevZone for Nordic related questions
  - Or email to [Workshop@NimbeLink.com](mailto:Workshop@NimbeLink.com)
- A recording of the webinar will be available together with the presentation at [webinars.nordicsemi.com](http://webinars.nordicsemi.com)



# Who is NimbeLink

- Rapid IoT Solutions
- Cellular-focused
- First with new technologies
- Crazy developer friendly
- Maker of cool educational videos!



# IoT Experts from Edge to Enterprise

## EMBEDDED SOLUTIONS

### SKYWIRE®

END-DEVICE CERTIFIED MODEMS BY NIMBELINK®

- ✓ Buy It Certified
- ✓ Connect Easy
- ✓ Deploy Faster<sup>SM</sup>



- 2G, 3G, 4G LTE, and 5G

## SERVICES



Connectivity



Custom  
Products



IoT  
Integration



Design  
Services



Manufacturing

### Edge to Enterprise

Partner with us for all your IoT needs.

## ASSET MANAGEMENT

### Track, monitor & manage your assets!

- Improve operational efficiency
- Track more assets
- Manage inventory better
- Improve fleet operations



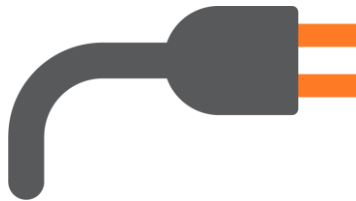
# What Makes Cellular Development So Hard?

# Why Cellular At All?

Direct Connectivity



Pre-Configured



Managed Network



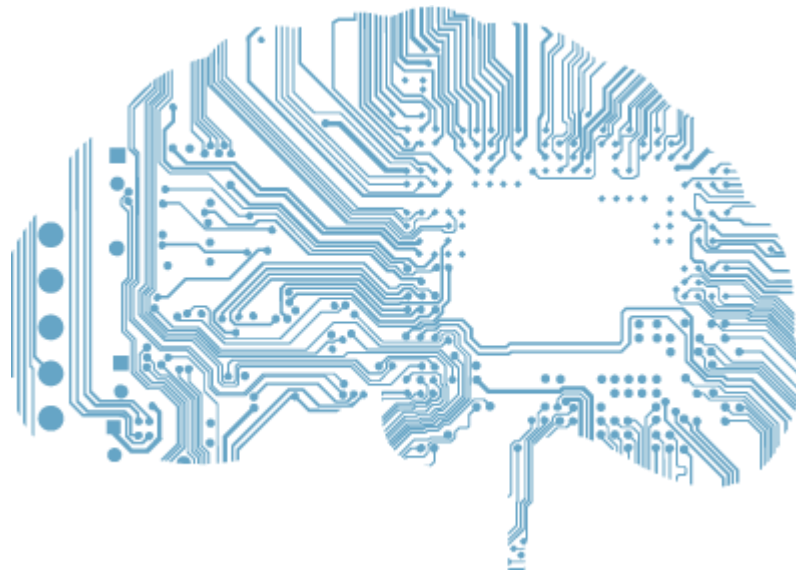
Ubiquity



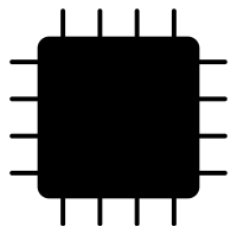


# Complexities of Cellular

- RF Engineering
- Constant Changes
- High Power Draw
- Costs (Initial & Ongoing)
- Certifications



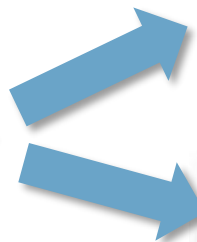
# Radio Types & Certifications



**Chipset**



**Module**



**End Device**



How Can Cellular Development  
Be Easier?

# Make It Easier!

- Reduce RF Engineering requirements
- Easy Dev Kits & Reference Designs
- Clear Documentation
- Reduce or Eliminate Certs
- ...and maybe also make it cheaper??

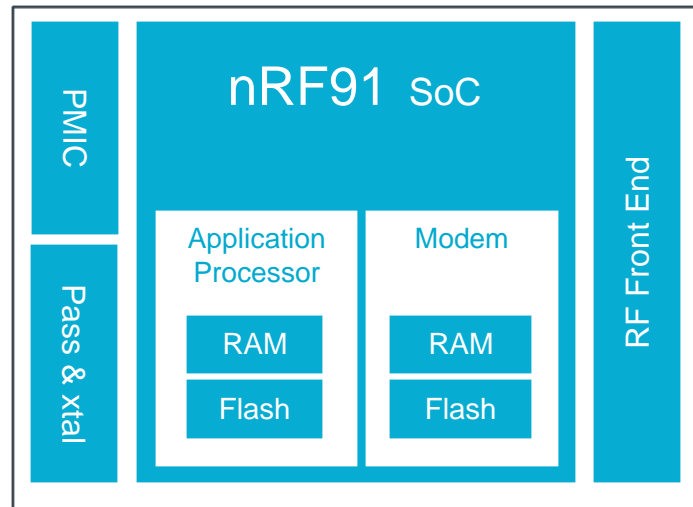




Enter the Nordic nRF9160 SiP

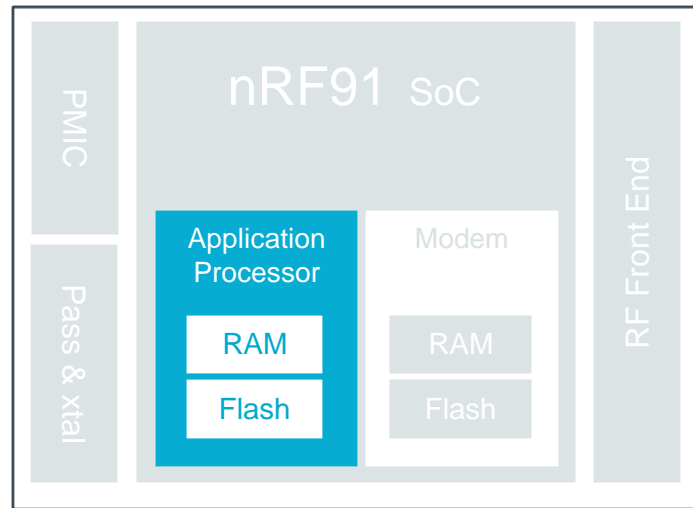
# Fully integrated SiP for low power cellular IoT

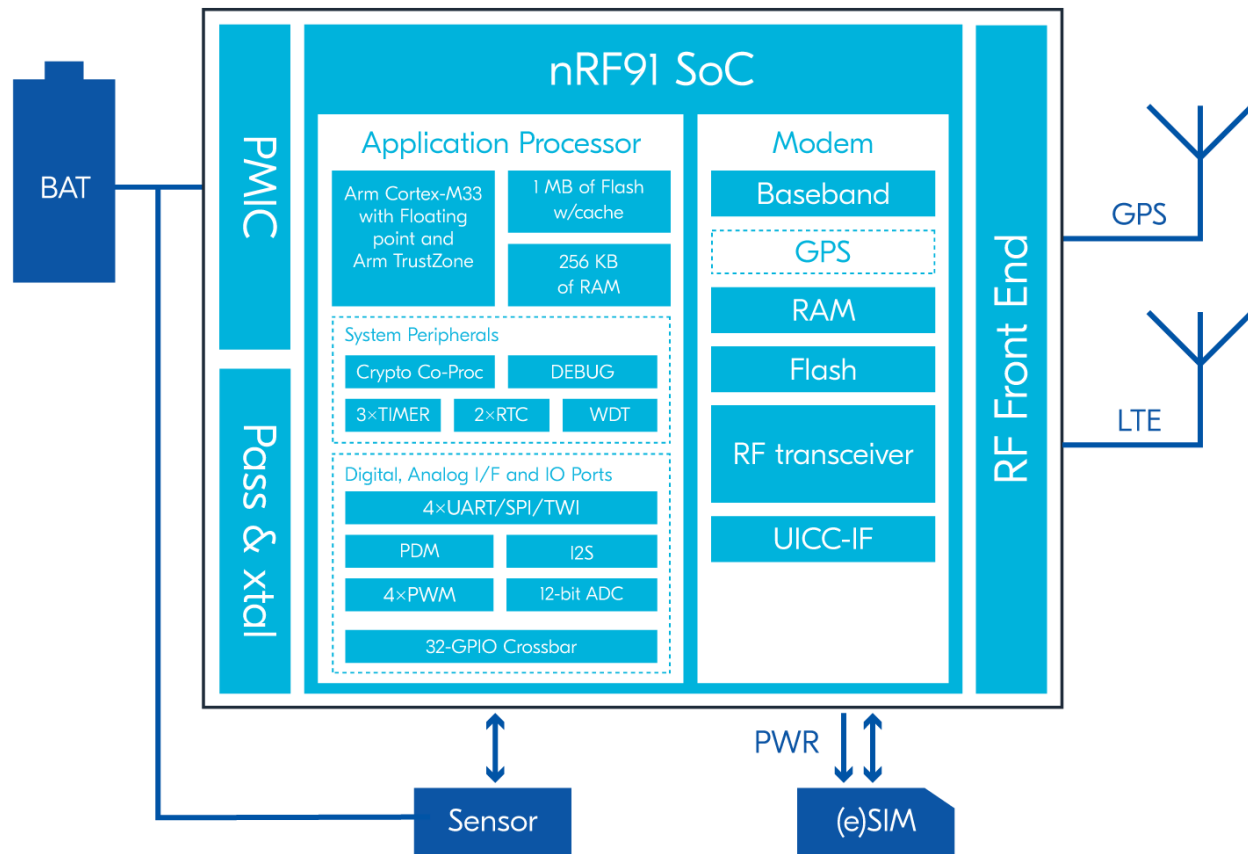
- Dedicated application processor and memory
- Multimode LTE-M / NB-IoT / GPS modem
- Pre-certified for global operation
- PMIC, passives and crystals
- 10x16x1 mm LGA package



# Dedicated application processor

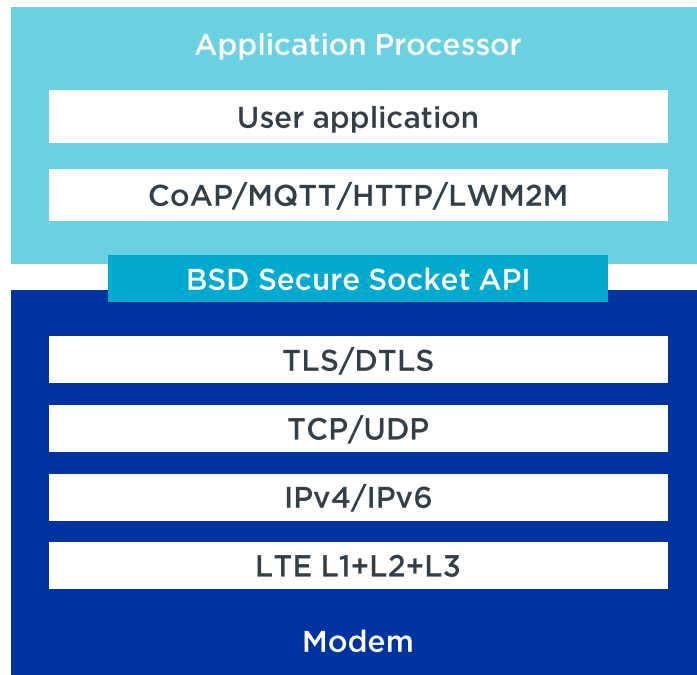
- 64 MHz Arm® Cortex®-M33 CPU
- Arm TrustZone® for trusted execution
- Arm CryptoCell® 310 for application layer security
- 1 MB Flash & 256 KB RAM
- 4 x SPIM/SPIS/UART/TWIM/TWIS
- PDM, I2S, PWM, ADC
- 32 GPIOs







# nRF9160 software architecture



# nRF Connect SDK



- Software development kit for the nRF9160
- Integrates the Zephyr RTOS
- Publicly hosted on GitHub, version control management with Git
- SEGGER Embedded Studio support for free
- A wide range of samples and applications

## nRF Connect SDK

Applications/samples

Application protocols

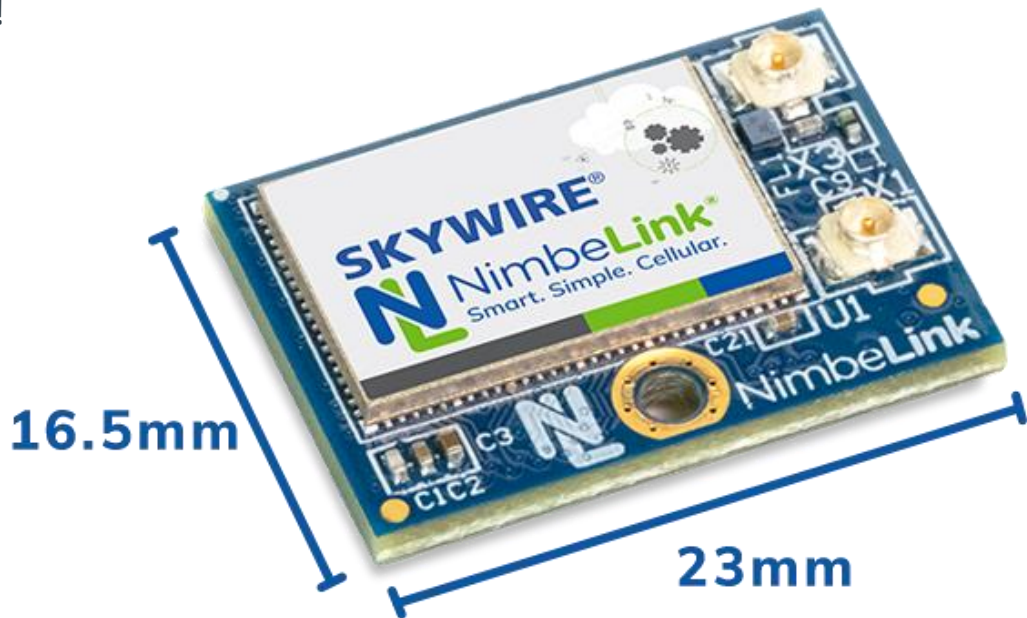
RTOS

Libraries

Hardware drivers

# Can It Get Even Easier?

- Introducing the Skywire Nano!



# Benefits of the Nano - Hardware

- Isolated RF Path
- Low Power
- Easy integration with a physical connector
- Bring Your Own Antenna
- Easy Dev Kit, including Reference Design
  - Onboard sensors, Grove connectors



# Benefits of the Nano - Software

- Client Mode (UART – AT Command)
- Standalone Mode
  - Full Zephyr RTOS
  - Nordic Peripheral Drivers
  - FOTA Function Support for Device and Module
- Thorough documentation, App Notes, etc.
- Fully End-Device Certified in North America
- ...and available without monthly data fees!



# Skywire Nano + Pre-Paid Data

## \$59 Unit Price For

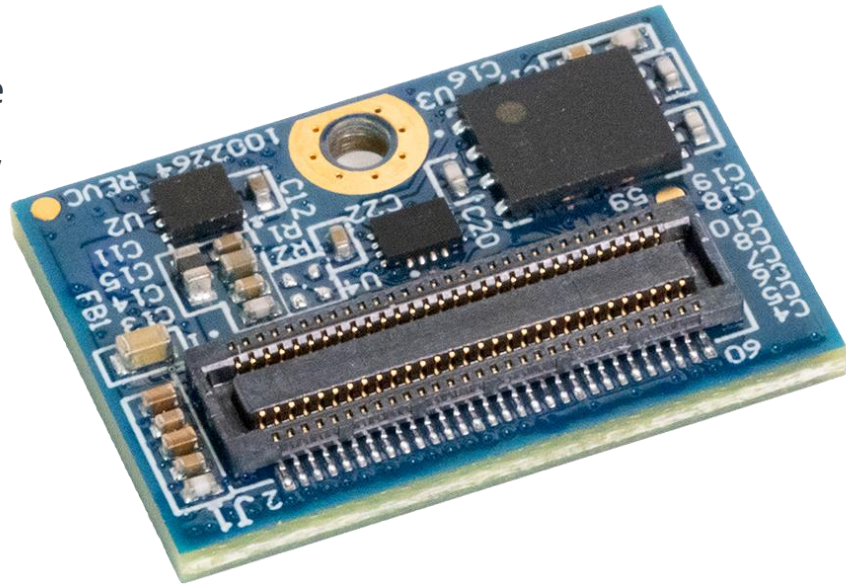
- All-in-one hardware and cellular data plan
- Up to **500MB of data**, up to 10 years of service
- Up to 250 SMS messages
- LTE-M network
- \$20 to refill data

## Advantages

- No additional costs, no hidden fees
- No overage fees
- Activated and ready to communicate
- Monthly reports of your data usage
- NimbeLink's dedicated support

# Skywire Nano Main Specs

- Tiny: 16.5 x 23 x 4mm
- Two Modes: Client Mode or Standalone
- Low Power in Both Modes: 2.4  $\mu$ A @ 5v
- Full Support for nRF9160 Functions
  - Cortex M33 processor & SDK
- LTE-M & NB-IoT, GPS
- Full Global Network Support
- 60-pin Molex Connector Interface
  - UART, SPI, I<sup>2</sup>C, PWM and a 14-bit ADC
  - 31 GPIO



# Example Device

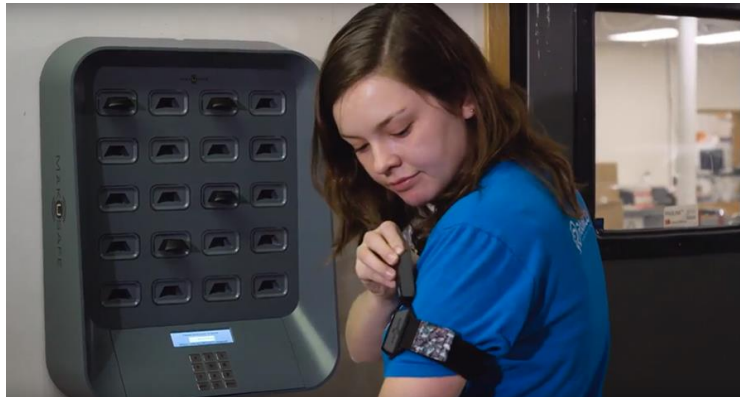
- Small Asset Tracker
  - Small & Lightweight
  - No Additional Processor Needed
  - LTE-M for Mobility
  - Small Rechargeable Battery
  - Global Operation
  - Quick Time To Market
  - 1-Time Purchase Option





# Example Device

- Factory Worker Safety Monitor
  - Sealed Enclosure
  - Small, Lightweight Battery
  - NB-IoT Connectivity
  - Low Cost Due To Simplicity of Design
  - 2 Month Development Cycle
  - 1-Time Radio Purchase



# How to Get More Information

- [shorturl.at/dilBR](https://shorturl.at/dilBR)
- [Workshop@NimbeLink.com](https://Workshop@NimbeLink.com)



Q&A

## More questions?



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- Or email to [Workshop@NimbeLink.com](mailto:Workshop@NimbeLink.com)



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# Thank You!

Brandon Hart

Email: [Workshop@NimbeLink.com](mailto:Workshop@NimbeLink.com)

# Appendix

Feature / Specification	Description
Application Processor	<b>CPU:</b> 64 MHz Arm® Cortex®-M33
RAM and Flash	<b>RAM:</b> 256 KB <b>Flash:</b> 1 MB
Application Processor Peripherals	<b>Serial Peripherals:</b> 4 x SPI, 4 x UART, 4 x Two Wire Interface (TWI), I <sup>2</sup> C, I <sup>2</sup> S  <b>Analog Peripherals:</b> PDM, PWM, 8/10/12-bit ADC with 8 input channels and 200 kHz sampling rate (up to 14-bit resolution when oversampling)  <b>Timers:</b> 3 x Timers, 2 x RTC Watchdog Timers
I/O Pins	<b>GPIO:</b> 31 x GPIO with flexible mapping for peripherals, 3 x 1.8V referenced GPIO for dynamic antenna tuning
Internet Protocols	<b>Transport Layer Protocols:</b> TCP/UDP, TLS/DTLS
Cellular Capabilities	<b>Cellular Technologies:</b> LTE-M, LTE CAT-NB1, and LTE CAT-NB2  <b>Internet Protocols:</b> IPv4, IPv6  <b>SMS:</b> PDU Mode  <b>Low Power Modes:</b> PSM, eDRX  <b>Operating Frequency Range:</b> 699 MHz to 1980 MHz  <b>Cellular Operation Mode:</b> HD-FDD  <b>RF Output Power:</b> -40 dBm to +23 dBm
LTE-M Specifications	<b>LTE-M Bands:</b> B1, B2, B3, B4, B5, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28, B66  <b>Low Band RX Sensitivity:</b> -108 dBm  <b>Midband Rx Sensitivity:</b> -107 dBm  <b>Uplink Speed:</b> 300 Kbps  <b>Downlink Speed:</b> 375 Kbps

Feature / Specification	Description
LTE CAT-NB1 and LTE CAT-NB2 Specifications	<b>LTE CAT-NB1 and LTE CAT-NB2 Bands:</b> B1, B2, B3, B4, B5, B8, B12, B13, B17, B19, B20, B25, B26, B28, B66  <b>RX Sensitivity:</b> -114 dBm  <b>Uplink Speed:</b> 30 Kbps  <b>Downlink Speed:</b> 60 Kbps
SIM Specification	<b>Soldered-Down SIM:</b> Verizon LTE-M MFF2 SIM integrated into the modem  <b>External Sim Interface:</b> Support for an external SIM interface
Cellular Certifications	<b>Verizon ODI:</b> Complete  <b>PTCRB:</b> Complete  <b>AT&amp;T:</b> In Progress  <b>GCF:</b> In Progress
GPS Specifications	<b>GPS Band:</b> GPS L1 C/A  <b>GPS Center Frequency:</b> 1575.42 MHz  <b>Sensitivity, Cold Start:</b> -142 dBm  <b>Sensitivity, Hot Start:</b> -145 dBm  <b>Sensitivity, Tracking:</b> -151 dBm  <b>Cold Start TTFF:</b> 40 seconds  <b>Hot Start TTFF:</b> 1.5 seconds
Power Supply Inputs	<b>Supply Voltage (VCC):</b> 3.3V to 5.0V <b>Typical Value:</b> 3.8V or 5V  <b>GPIO Reference Voltage (VCC_GPIO):</b> 1.8V to 3.6V <b>Typical Value:</b> 1.8V or 3.3V



Feature / Specification	Description
Typical Power Consumption (VCC = 5V, VCC_GPIO = 3.3V)	<b>Socket Dial, Good Signal Strength:</b> Avg: 24 mA, Max: 46 mA <b>Socket Dial, Fair Signal Strength:</b> Avg: 25 mA, Max: 108 mA <b>Socket Dial, Poor Signal Strength:</b> Avg: 27 mA, Max: 344 mA <b>Registered Idle:</b> Average: 3.58 mA, Max: 36 mA <b>Unregistered Idle:</b> Average: 533 uA, Max: 7.5mA <b>Powered Off:</b> Average: 2.4 uA, Max: 71 uA <b>GPS:</b> Average: 43 mA, Max: 59 mA <b>PSM and eDRX:</b> <i>Coming Soon</i> <b>eDRX:</b> <i>Coming soon</i>
Physical Characteristics	<b>Dimensions (unmated):</b> 0.906" x 0.650" x 0.157" (23.00 mm x 16.5 mm x 4 mm) <b>Dimensions (mated):</b> 0.906" x 0.650" x 0.172" (23.00 mm x 16.50 mm x 4.36 mm) <b>Mass:</b> 2 grams (approx.)
Environmental Conditions	<b>Operating / Storage Temperature Range:</b> -40 °C to 85 °C <b>Humidity Range:</b> 20 %RH to 90 %RH

