

Additional Issues

Introduction

This module is a place for all those extra items that crop up after the main material has been presented. At this time, the only thing we have left is Locationing.

Objectives

- Locationing

*** no matter how far you go, there you are ***

Module Topics

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*** Then they came for me (Stephen F. Rohde) ***

CC2431 Location Engine

Location Engine Example

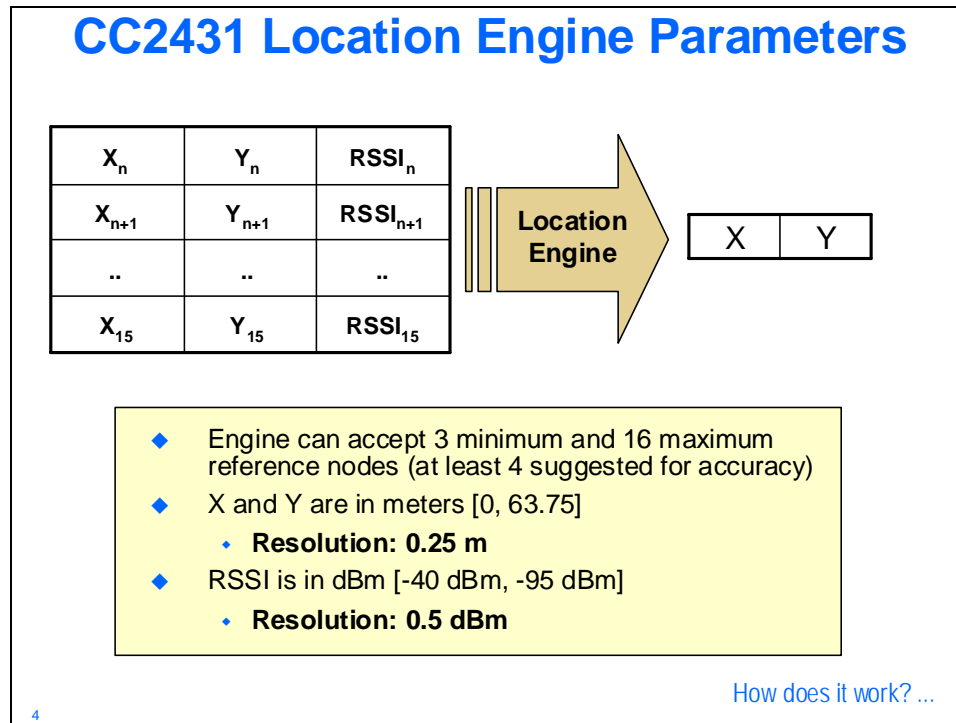
- | | |
|--|--|
| <ul style="list-style-type: none"> ◆ Yellow Nodes ◆ Reference nodes ◆ Known fixed location | <ul style="list-style-type: none"> ◆ Green Node ◆ Blind node ◆ Movable |
|--|--|



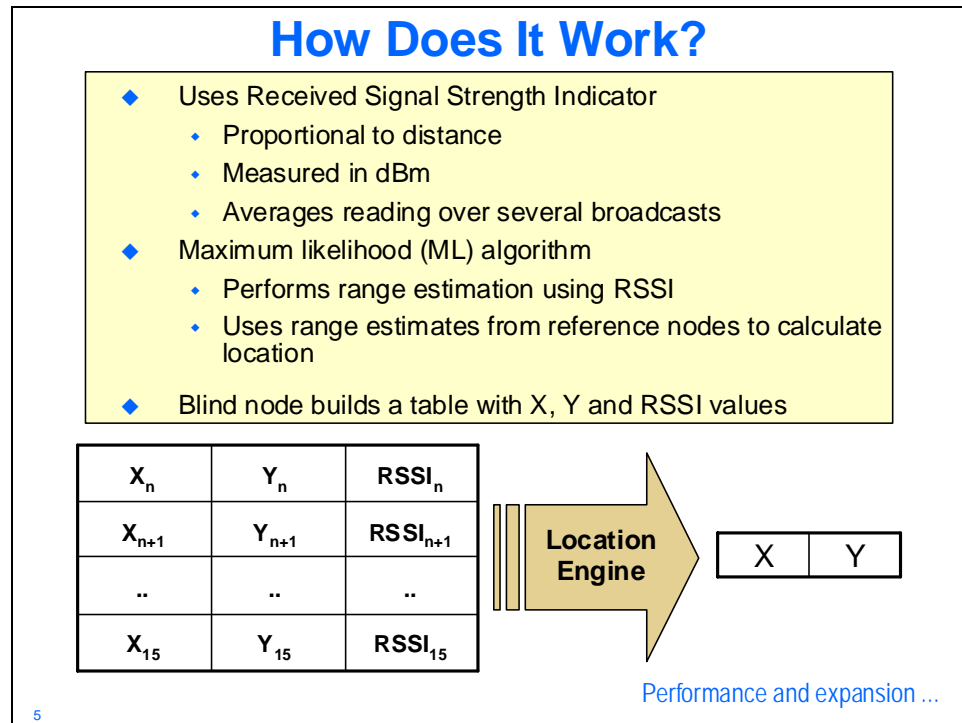
[Parameters ...](#)

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Parameters



Operation



Performance and Expansion

Performance and Expansion

Time to estimate location	35us - 13ms
Reference node location precision	0.25 meter
Location Range	64 x 64 meters (Software expandable)
Blind node location precision	0.5 meter

More range expansion ...

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More Range Expansion

- ◆ Map the coordinates of the red node to (32, 32)
- ◆ Map the coordinates of the surrounding nodes
- ◆ The location engine gives position relative to the red node
- ◆ Range expansion is automatically handled by location engine software

Sources of error ...

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Sources of Error

Sources of Localization Error

- ◆ Small-scale and large-scale fading. Use of diversity and intelligent scene analysis helps.
- ◆ Propagation model parameters. Use local reference links to estimate model. Iterative path loss parameter estimation.
- ◆ Geometric Dilution Of Precision (GDOP). Use regular shapes for deployment. Area of interest surrounded by reference nodes
- ◆ Composite Antenna pattern, temperature and frequency effects. Adaptive estimation of antenna gain through an iterative process.
- ◆ Algorithm Estimation, Local minima, badly conditioned matrices. Need for low complexity initial coordinate estimates (i.e. Coarse location can be achieved via connectivity information). Need for bounding algorithm.
- ◆ Quantization of observations and algorithm implementation.
- ◆ RSSI linearity (over range, over frequency), TX, Rx power accuracy.
- ◆ Device variability

Courtesy of Motorola Labs, Plantation, Florida

[Documentation ...](#)

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Documentation

CC2431 ZDK Documentation

Quick Start Guide

- *CC2431DK_ZDK_Quick_Start.pdf*

Application Note

- *AN042 -- CC2431 Location Engine*

User Guide:

- *CC2431DK Development Kit User Manual.pdf*

Private Location Profile:

- *Z-Stack Location Profile F8W-2006-0002.pdf*
- *Z-Stack Location Profile User's Guide F8W-2006-0008.pdf*