

Introductory resources on RF systems/circuits and designs:

Lou Nigra

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As an overview of the general principles involved in the Two Way Comm project, here's a talk by TI on general Radio Communications. Contrary to the title's inference, I think it assumes some basic knowledge of RF circuits, but covers the radio communications aspects pretty well. It includes a slide on the radio link calculations to determine what range can be achieved. The rf-circuits.info link further down has a lesson in the "Radio" drop-down list that explains it in more detail:

<http://www.ti.com/lit/ml/slup127/slup127.pdf>

Here are the basics that lead to RF circuit design concepts: The generalized Ohm's law $V=IZ$, where R is replaced by Z , a complex quantity that's dependent on signal frequency:

http://en.wikipedia.org/wiki/Electrical_impedance

This makes analyzing circuits with sinusoidal inputs (i.e. - RF) that have capacitors and inductors as well as resistors, mathematically the same as with resistors only. You just have to use complex math instead of real math.

An essential concept for non-RF circuits is how resistors (R) combine in series and in parallel. The same formulas apply for RF circuits when combining impedances (Z) but because they are complex quantities, it leads to some very useful circuit design methods for what's known as "impedance matching" for maximum power transfer. At very low frequencies, like audio you have to use bulky transformers - magnetically coupled wire solenoids. At high frequencies like RF, it becomes practical to exploit the complex impedance combining formulas to do this with small capacitors and inductors as is done between the CC1101 chip and the antenna on our chipcon board.

This concept is addressed in the first lesson of this seemingly pretty good tour of RF design:

<http://rf-circuits.info/>

Note that the first item in the "Radio" list, "Impedance Matching" has a progressive series on this topic.