Design – Antennas & Range

Cape Town Range Test

Richard Wallace
Rodney Farrow
Adrian Grindon

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Wirelessly connecting everywhere.

Antenna System Design
Range Testing CC112x in Cape Town

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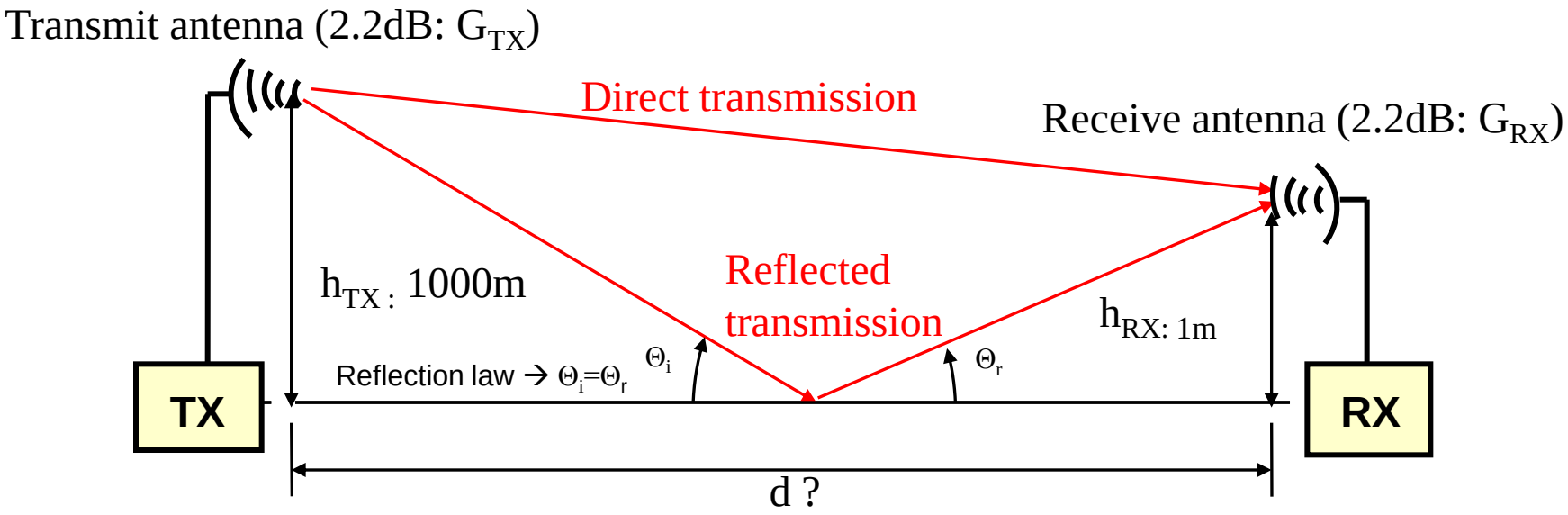

Link Budget = Output Power + Transmit Antenna gain (G_{TX}) + Receiver Antenna gain (G_{RX}) – Sensitivity

Link Budget = 14 + 2 + 2 – 120 = 138 dB

Expected Range Distance ?

Texas Instruments

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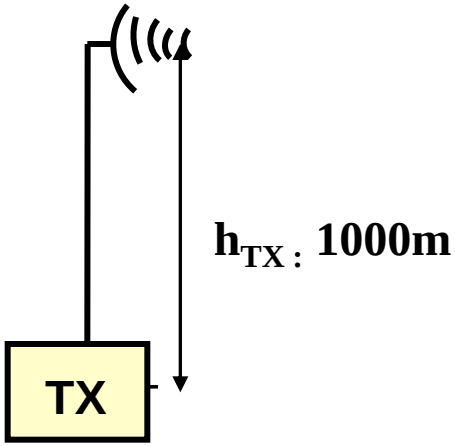

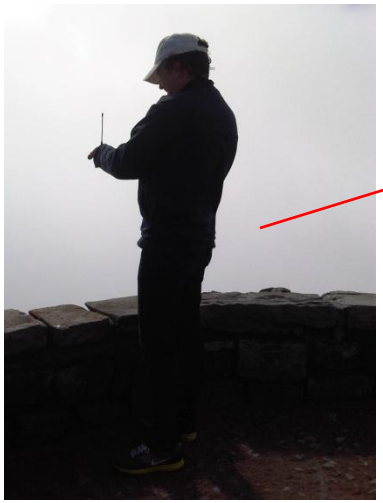

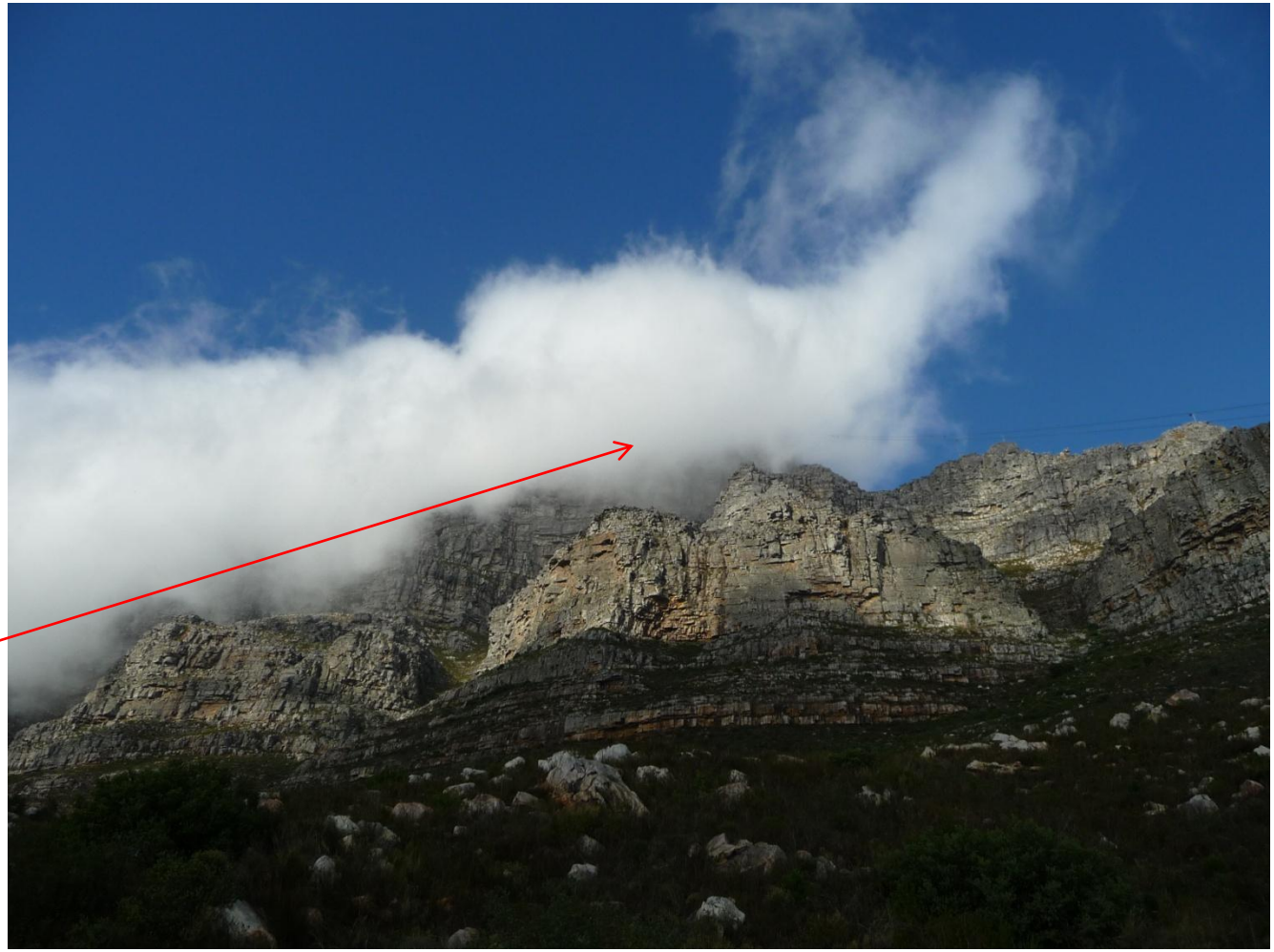

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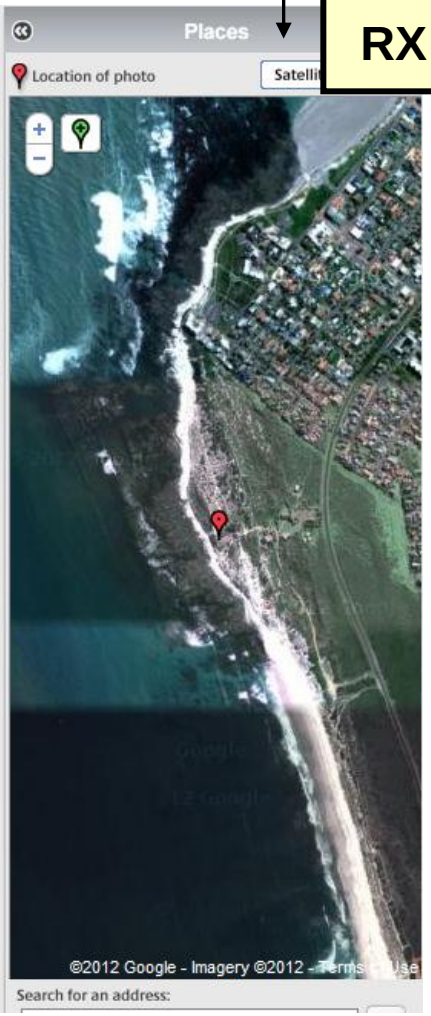

$h_{RX: 1m}$

RX

Antenna System Design – Cape Town Range Test
Master Slave PER Test

Antenna System Design – Cape Town Range Test
Slave Master PER Test

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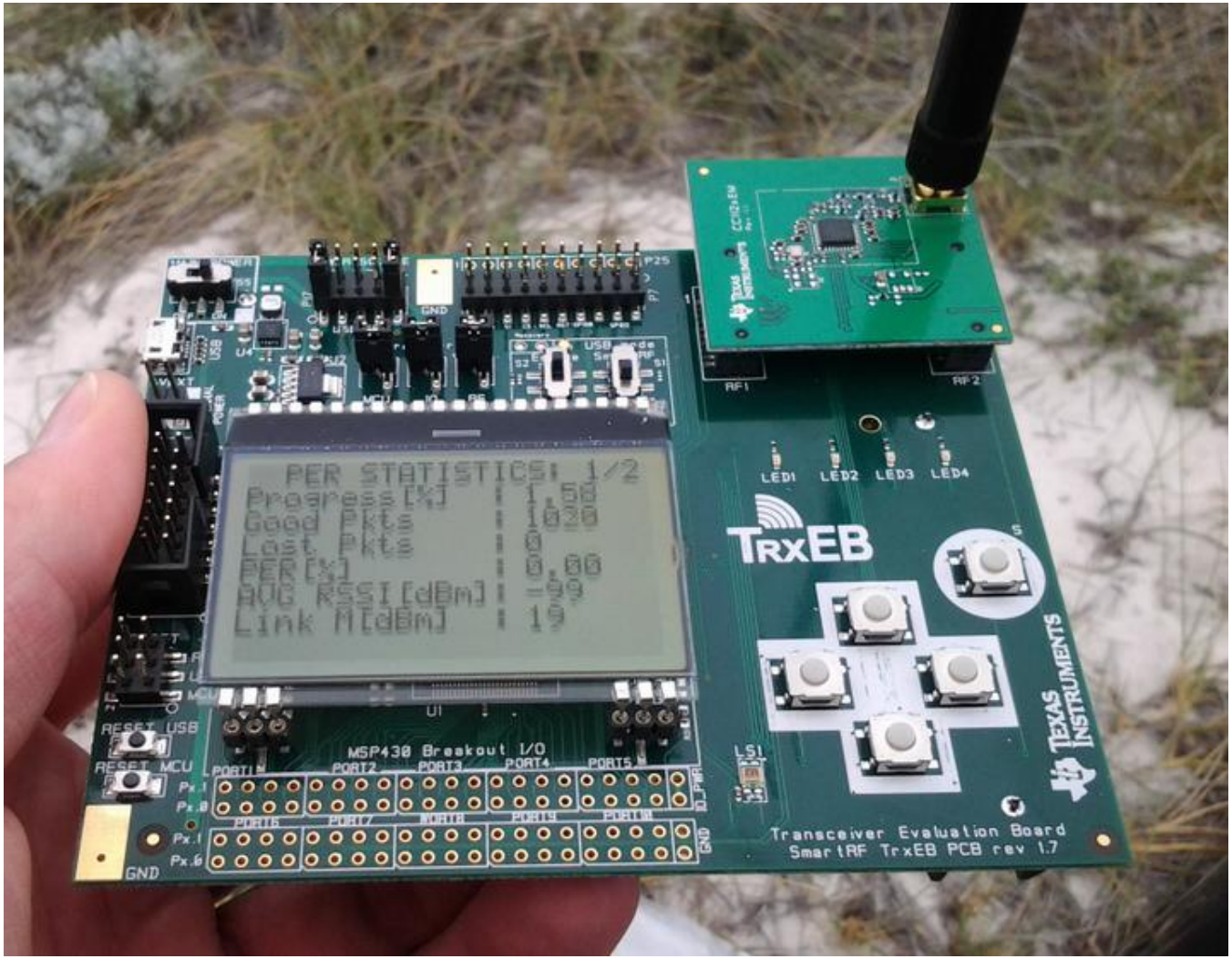
Slave Master PER Test



- 1020 packets received with 0% PER at 25km.

-Standard omni-directional antenna

- No PAs or LNAs used

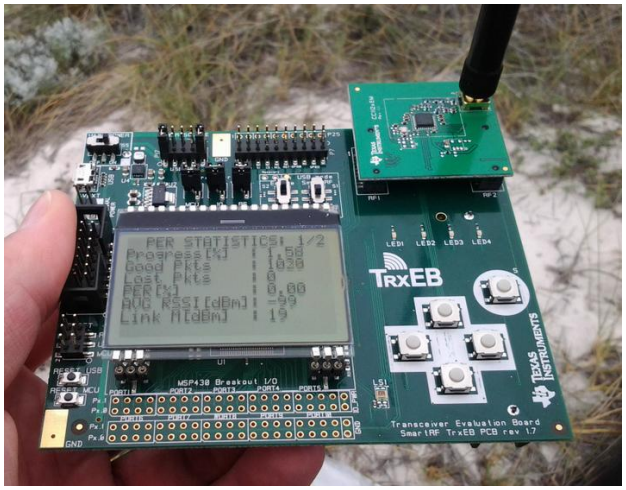
- **CC112x Used !**

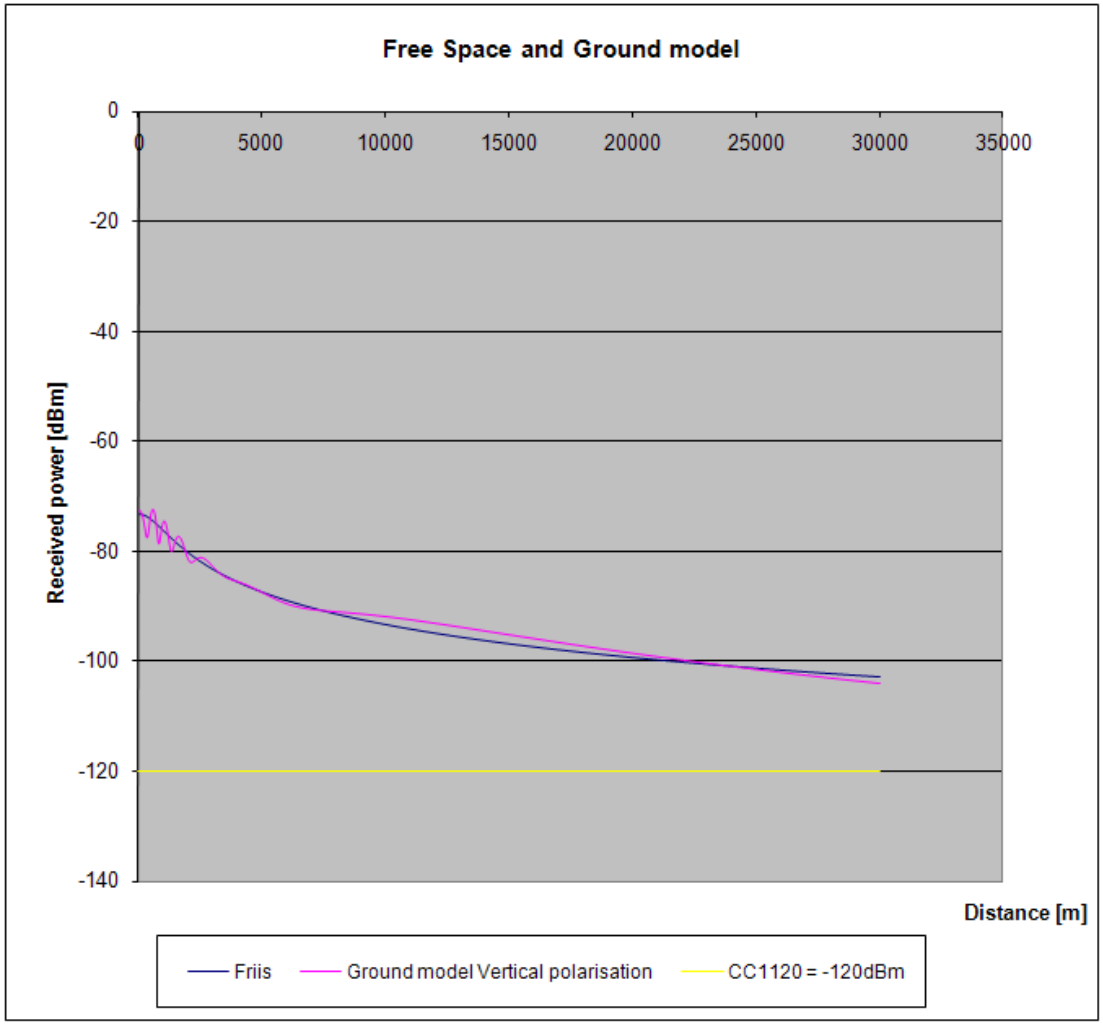
Antenna System Design – Cape Town Range Test
Slave Master PER Test

Friis_equation_with_Ground_model

Transmitting antenna location, height over ground	1000.0	[m]
Receiving antenna location, height over ground	1	[m]
Distance between antennas	30000	[m]
Frequency	868	[MHz]
Signal polarity Horisontal=H, Vertical=V	v	
Transmitted power (suplied from transmitter)	14	[dBm]
Gain in Transmitting antenna	2	[dB]
Gain in Receiving antenna	2	[dB]
Dielectric constant for ground (typical 18)	18	
Index	6	

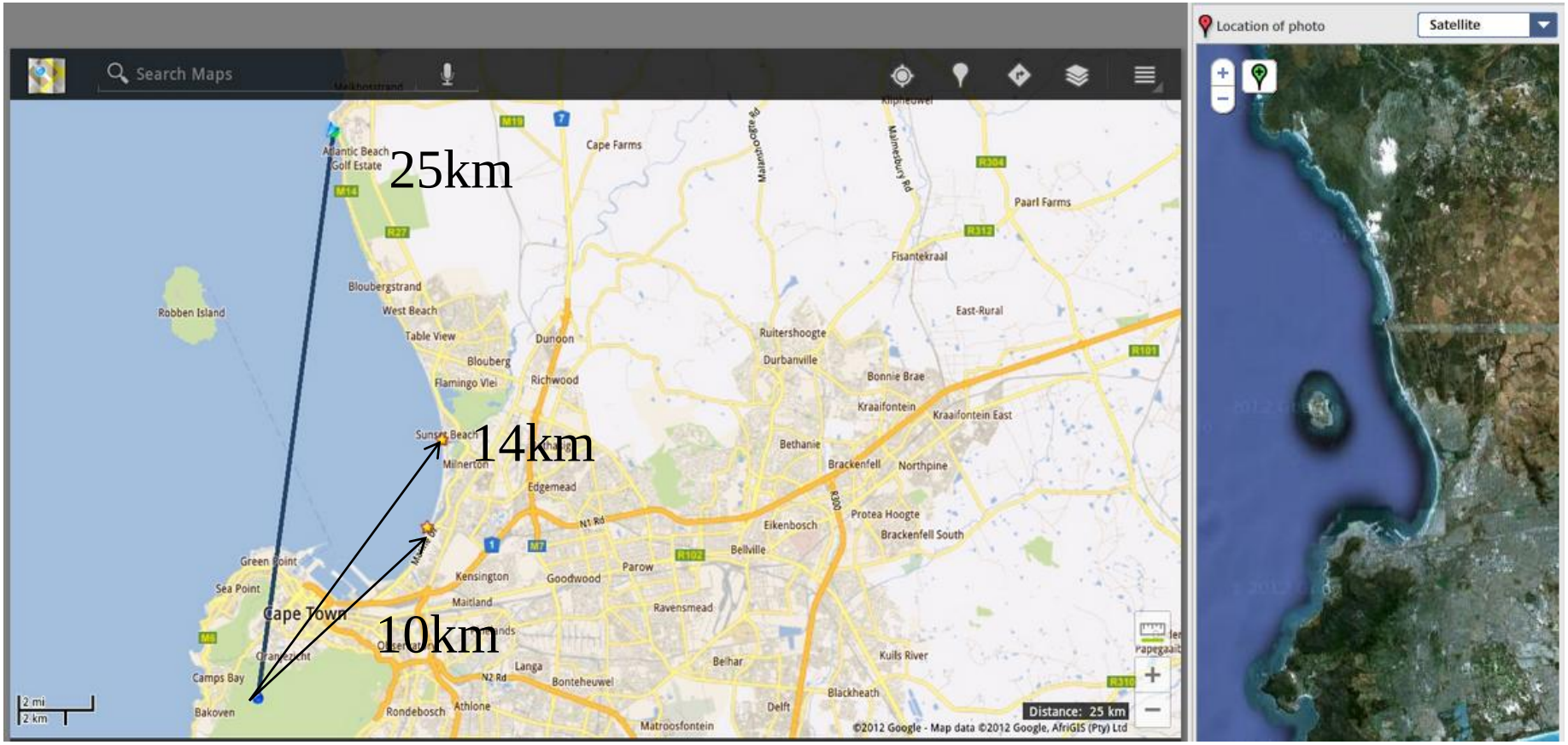
CC1120 = -120dBm





Good received power correlation with excel range model.

Antenna System Design – Cape Town Range Test
Slave Master PER Test



1020 packets received with 0% PER at 25km, 1.2kbps, 14dBm output power, standard omni-directional antenna. No PAs or LNAs used. Standard CC112x development kit used. **What Range Can You Achieve with CC112x ?**