nRF24L01 vs CC2500
Key Features

	CC2500	nRF24L01	Comment
Radio	2.4 GHz GFSK/2-FSK/MSK Transceiver	2.4 GHz GFSK Transceiver	
Range	10 m+	10 m+	
Max data rate	500 kbps	2 Mbps	4X
Supply voltage	1.8 to 3.6 V	1.9 to 3.6 V	
Operating temperature	-40 to 85 ºC	-40 to + 85 ºC	
Required passive count	14	14	Including antenna match
Crystal Spec	± 20 ppm	± 60 ppm	Cheaper Crystal
Input pad tolerance	3.6 V	5.25 V	No lever shifter for USB

nRF24L01 vs CC2500
RF and AC Parameters

	CC2500	nRF24L01	Comment
Sensitivity	- 82 dBm @ 500kbps - 87 dBm @ 250kbps	- 82 dBm @ 2Mbps - 85 dBm @ 1Mbps	
Power down to active	1.1 ms*	1.63 ms	*considerably higher power consumption, see next slide
Standby to active	818µs (98 µs if already calibrated)	130 us	

nRF24L01 vs CC2500
Power Consumption

	CC2500	nRF24L01	Comment
RX Current	**19.6 mA** (input at sensitivity level @ 500kbps)	**12.3 mA**	**37% lower RX power consumption**
TX Current (0dBm)	21.2 mA	**11.3 mA**	**47% lower TX power consumption**
Power down	**400nA**	900 nA	**CC2500 has better Power Down power consumption***
Standby	1.5mA	**32 uA**	**CC2500 has SIGNIFICANTLY higher power consumption**

*to what degree does the 900nA Power down consumption affect the overall battery lifetime?
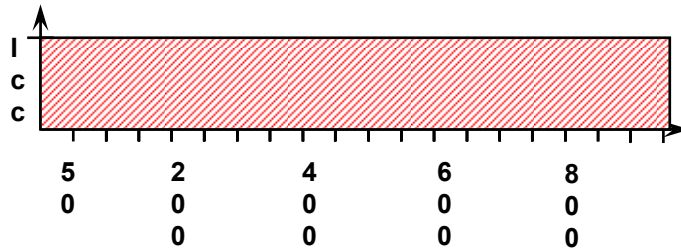Example: CR2032 coin cell battery (typ. 220mAh):

$$Battery\_life = \frac{220mAh}{900nA} = 244444hrs = 10185days = 27.9years$$
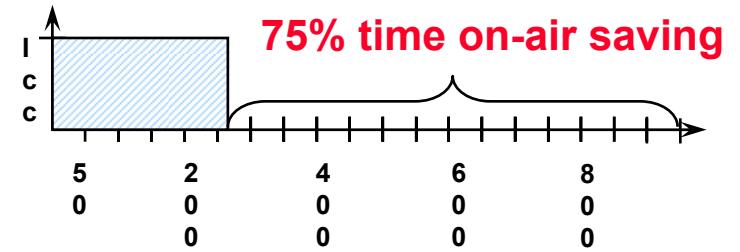
nRF24L01 is unparalleled for low power consumption

nRF24L01 vs CC2500
Payload Power Consumption

CC2500 at 500kbps

nRF24L01 at 2 Mbps

75% time on-air saving

	CC2500	nRF24L01	Δ
On Air time	**100%**	**25%**	**75% lower (0.25X)**
nRF24L01 RX Total Power Saving	**84 % lower (0.25 × 0.63X = 0.16X)**		
nRF24L01 TX Total Power Saving	**87% lower (0.25 × 0.53X = 0.13X)**		

Total Power Saving = Time on-air saving × Active Current Saving

CC2500 burns a lot of power

nRF24L01 vs CC2500
On-Chip Packet Handling

	CC2500	nRF24L01	Comment
Framing	Yes	Yes	
CRC	Yes	Yes	**ShockBurst**
Auto Acknowledgment	No	**Yes**	**Enhanced ShockBurst**
Auto Retransmit	No	**Yes**	**Enhanced Shockburst**
Packet error loss (PER) Measurements	No	**Yes**	
RSSI	**Yes**	No	

On-chip Auto Retransmit
- Lower cost due to no need for MCU with hardware SPI
- Less total power consumption due to tight timing

Packet error loss measurement
- Used in conjunction with carrier detect to decide on quality of the channel
- Easier to implement coexistence optimized protocols

nRF24L01 vs CC2500
RSSI vs Packet Loss Counting

- **RSSI will not be able to pick up the disturbance from frequency hopping or ShockBurst enabled systems in a way that is useful to the system protocol**

- **Packet Loss Counting will always give the true indication of the channel quality**

Blind sone

Packet on air

RSSI system wants to transmit and goes into TX mode
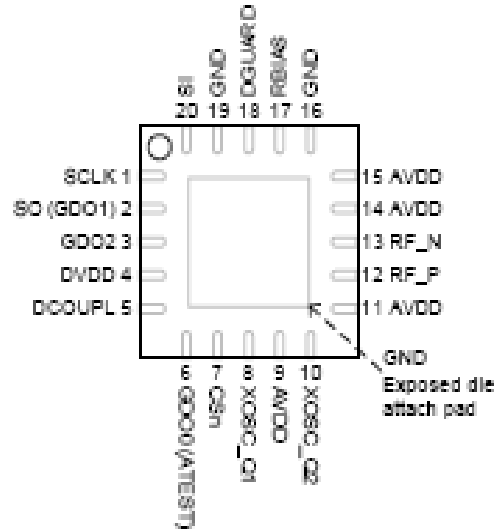
t [ms]
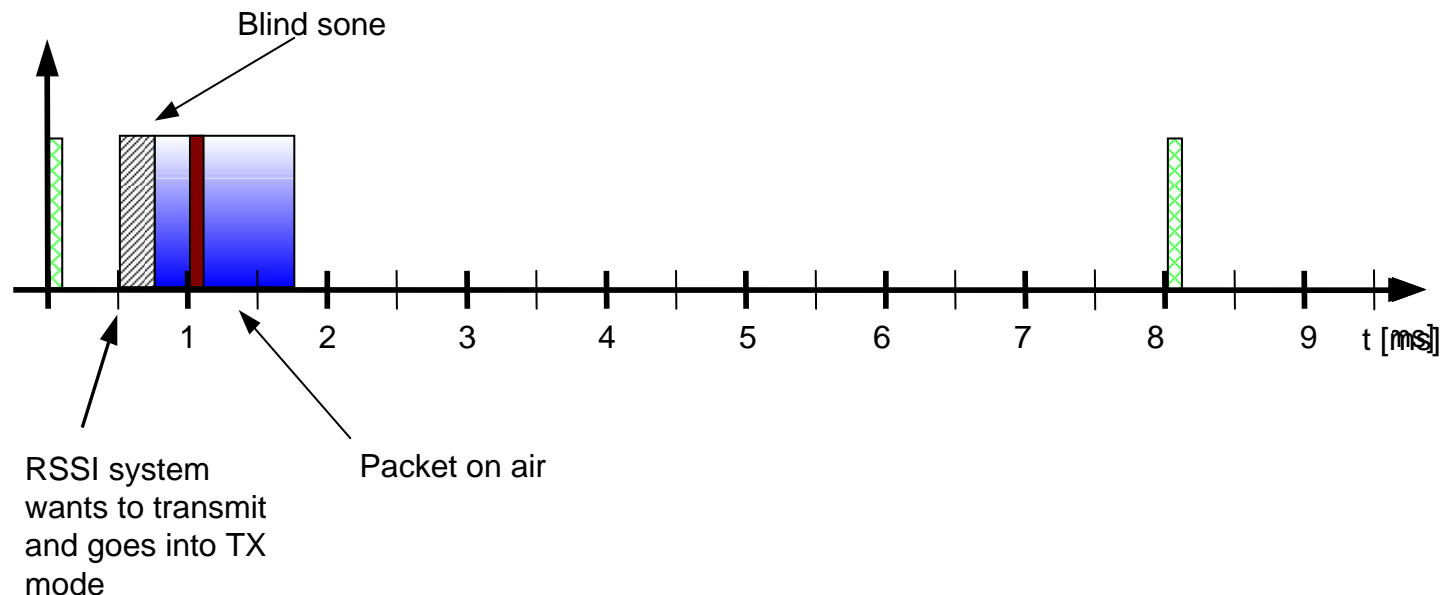
The RSSI functionality will not be able to detect the traffic that is actually colliding with own traffic. The Packet Loss Counting method is only taking decisions on the actual packet loss. So why do you need RSSI ?
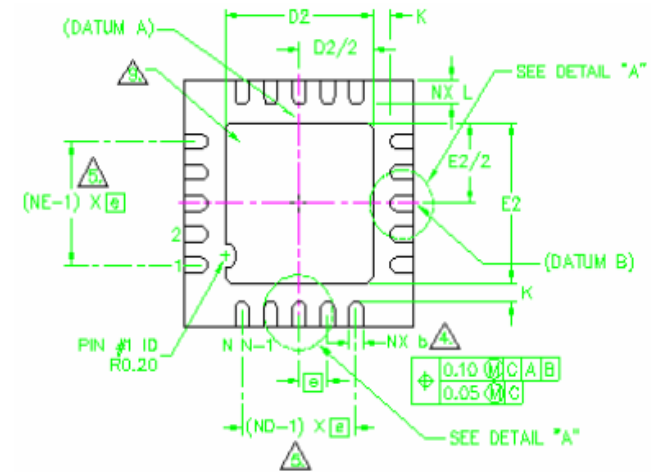
nRF24L01 vs CC2500
Physical Specifications

CC2500
20-pin 4x4mm QLP

nRF24L01
20-pin 4x4mm QFN

	CC2500	nRF24L01	Saving
Size	4 x 4 mm	4 x 4 mm	None
Pins	20	20	None

nRF24L01 vs CC2500
Summary

- **nRF24L01 has higher data rate**
  - **4X compared to CC2500 in 500 kbps mode**
  - **8X compared to CC2500 in 250 kbps mode**

- **nRF24L01 at 2 Mbps provides huge power savings**
  - **More than 82% saving compared to CC2500 in 500 kbps mode**

- **nRF24L01 provides *on-chip* hardware support for up to 6 "slave devices"**

- **nRF24L01 provides *on-chip* hardware supports for auto retransmits**