Optimum Range for Tactical Radios in DTDMA

Applicable Release: NetSim v13.3.17 or higher.

Applicable Version(s): Pro

Project download link: See Appendix-1. The URL has the configuration files (scenario, settings, and other related files) of the examples discussed in this analysis for users to import and run in NetSim.

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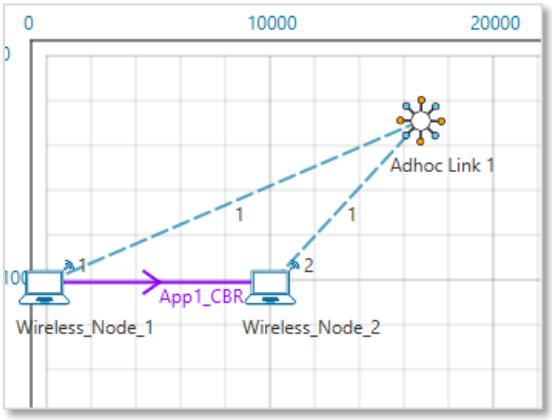
1. Transmission Range: HF Band

Scenario:



Application Properties:

Application Properties	
Application Method	Unicast
Application Type	CBR
Transport Protocol	UDP
Packet Size(bytes)	1460
IAT (micro sec)	20000

Formula to Calculate Packet Error Rate:

$$Packet\ Error\ Rate = \frac{Errored\ Packets}{(Errored\ Packets + Successfull\ Packets)}$$

Case 1: Receiver sensitivity = -95 dBm, path loss exponent = 3.5
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-95
TX Power (W)	20
Band	HF-Band
Lower Frequency (MHz)	3
Upper Frequency (MHz)	23
General	

Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	3.5

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
40000	0.23	0.00
41000	0.23	0.00
42000	0.23	0.00
43000	0.23	0.00
44000	0.23	0.00
45000	0.23	0.00
45100	0.23	0.00
45200	0.23	0.00
45300	0.23	0.00
45400	0.23	0.00
45500	0.00	0.00
45600	0.00	0.00

Table 1 :Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 2: Receiver sensitivity = -100 dBm, path loss exponent = 3.5
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-100
TX Power (W)	20
Band	HF-Band
Lower Frequency (MHz)	3
Upper Frequency (MHz)	23
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	3.5

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
50000	0.23	0.00
51000	0.23	0.00
52000	0.23	0.00
53000	0.23	0.00
54000	0.23	0.00
55000	0.23	0.00
56000	0.23	0.00

57000	0.23	0.00
58000	0.23	0.00
59000	0.23	0.00
60000	0.23	0.00
61000	0.23	0.00
62000	0.23	0.00
63000	0.23	0.00
63100	0.23	0.00
63200	0.00	0.00
63400	0.00	0.00

Table 2:Throughput (Mbps) and Packet Error Rate vs. Distance (m)

Case 3: Receiver sensitivity = -105 dBm, path loss exponent = 3.5
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-105
TX Power (W)	20
Band	HF-Band
Lower Frequency (MHz)	3
Upper Frequency (MHz)	23
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Path loss Exponent	3.5

Results:

Distance (m)	**Throughput (Mbps) FEC- True**	**Packet Error Rate FEC- True**
80000	0.23	0.00
81000	0.23	0.00
82000	0.23	0.00
83000	0.23	0.00
84000	0.23	0.00
85000	0.23	0.00
86000	0.23	0.00
87000	0.23	0.00
87100	0.23	0.00
87200	0.23	0.00
87300	0.23	0.00
87400	0.23	0.00
87500	0.23	0.00
87600	0.23	0.00
87700	0.23	0.00
87800	0.00	0.00
87900	0.00	0.00

Table 3:Throughput (Mbps) and Packet Error Rate vs. Distance (m)

Case 4: Receiver sensitivity = -110 dBm, path loss exponent = 3.7
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-110
TX Power (W)	20
Band	HF-Band
Lower Frequency (MHz)	3
Upper Frequency (MHz)	23
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Path loss only
Path loss Model	Log Distance
Path loss Exponent	3.5

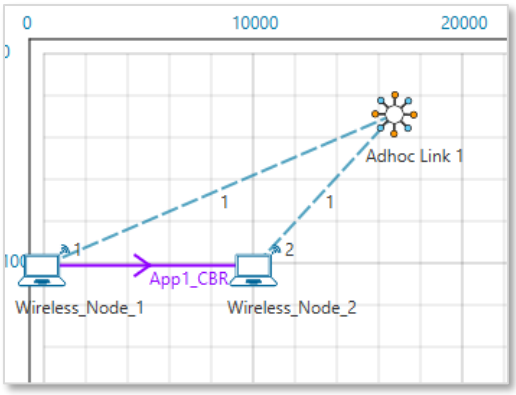
Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
45000	0.23	0.00
47000	0.23	0.00
49000	0.23	0.00
51000	0.23	0.01
53000	0.22	0.06
55000	0.15	0.41
57000	0.01	0.99
57500	0.00	1.00
58000	0.00	1.00
58500	0.00	1.00
59000	0.00	1.00

Table 4:Throughput (Mbps) and Packet Error Rate vs. Distance (m)

2. Transmission Range: VHF Band

Scenario:



Case 1: Receiver sensitivity = -90 dBm, pathloss exponent = 2.9
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	
TX Power (W)	20
Band	VHF-Band
Lower Frequency (MHz)	30
Upper Frequency (MHz)	50
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	3.1

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
15000	0.23	0.00
16000	0.23	0.00
17000	0.23	0.00
18000	0.23	0.00
18100	0.23	0.00
18200	0.00	0.00
18300	0.00	0.00
18400	0.00	0.00
18500	0.00	0.00

Table 5:Throughput (Mbps) and Packet Error Rate vs. Distance (m)

Case 2: Receiver sensitivity = -95 dBm, path loss exponent = 3
Settings

PHY Layer- DTDMA

Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	
TX Power (W)	20
Band	VHF-Band
Lower Frequency (MHz)	30
Upper Frequency (MHz)	50
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	3.1

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
20000	0.23	0.00
21000	0.23	0.00
22000	0.23	0.00
23000	0.23	0.00
24000	0.23	0.00
25000	0.23	0.00
26000	0.23	0.00
26100	0.23	0.00
26200	0.23	0.00
26300	0.00	0.00
26400	0.00	0.00
26500	0.00	0.00

Table 6:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 3: Receiver sensitivity = -100 dBm, path loss exponent = 3.1
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	
TX Power (W)	20
Band	VHF-Band
Lower Frequency (MHz)	30
Upper Frequency (MHz)	50
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	3.1

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
35000	0.23	0.00
36000	0.23	0.00
37000	0.23	0.00
38000	0.23	0.00
38100	0.00	0.00
38200	0.00	0.00
38300	0.00	0.00
38400	0.00	0.00
38500	0.00	0.00

Table 7:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 4: Receiver sensitivity = -105 dBm, path loss exponent = 3.1
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	
TX Power (W)	20
Band	VHF-Band
Lower Frequency (MHz)	30
Upper Frequency (MHz)	50
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	3.1

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
75000	0.23	0.00
76000	0.23	0.00
77000	0.23	0.00
78000	0.23	0.00
79000	0.23	0.00
79100	0.23	0.00
79200	0.23	0.00
79300	0.23	0.00
79400	0.23	0.00
79500	0.00	0.00
79600	0.00	0.00

Table 8:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 5: Receiver sensitivity = -110 dBm, path loss exponent = 3.1
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	
TX Power (W)	20
Band	VHF-Band
Lower Frequency (MHz)	30
Upper Frequency (MHz)	50
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	3.1

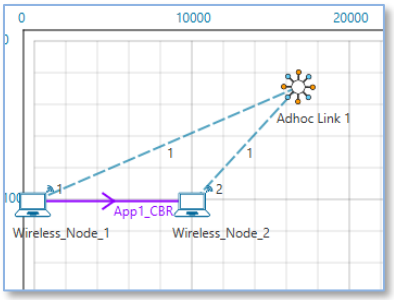
Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
115000	0.23	0.00
117000	0.23	0.00
119000	0.23	0.00
121000	0.23	0.00
123000	0.23	0.00
125000	0.23	0.00
127000	0.23	0.00
129000	0.23	0.01
131000	0.23	0.02
133000	0.23	0.03
135000	0.22	0.06
137000	0.21	0.12
139000	0.19	0.22
141000	0.16	0.36
143000	0.12	0.58
145000	0.06	0.82
147000	0.02	0.95
149000	0.00	0.99
151000	0.00	1.00
153000	0.00	1.00
155000	0.00	1.00

Table 9:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

3. Transmission Range: UHF-Band

Scenario:



Case 1: Receiver sensitivity = -90 dBm, pathloss exponent = 2.7
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-90
TX Power (W)	20
Band	UHF-Band
Lower Frequency (MHz)	300
Upper Frequency (MHz)	320
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.7

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
5000	0.23	0.00
6000	0.23	0.00
7000	0.23	0.00
7100	0.23	0.00
7200	0.23	0.00
7300	0.23	0.00
7400	0.23	0.00
7500	0.23	0.00
7600	0.23	0.00
7700	0.23	0.00
7800	0.00	0.00
7900	0.00	0.00

Table 10:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 2: Receiver sensitivity = -95 dBm, path loss exponent = 2.7
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-90
TX Power (W)	20

Band	UHF-Band
Lower Frequency (MHz)	300
Upper Frequency (MHz)	320
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.7

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
5000	0.23	0.00
6000	0.23	0.00
7000	0.23	0.00
8000	0.23	0.00
9000	0.23	0.00
10000	0.23	0.00
11000	0.23	0.00
11100	0.23	0.00
11200	0.23	0.00
11300	0.23	0.00
11400	0.23	0.00
11500	0.23	0.00
11600	0.23	0.00
11700	0.23	0.00
11800	0.23	0.00
11900	0.00	0.00
12000	0.00	0.00

Table 11:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 3: Receiver sensitivity = -100 dBm, path loss exponent = 2.7
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	
TX Power (W)	20
Band	UHF-Band
Lower Frequency (MHz)	300
Upper Frequency (MHz)	320
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.7

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
10000	0.23	0.00
11000	0.23	0.00
12000	0.23	0.00
13000	0.23	0.00
14000	0.23	0.00
15000	0.23	0.00
16000	0.23	0.00
17000	0.23	0.00
18000	0.23	0.00
18100	0.23	0.00
18200	0.00	0.00
18300	0.00	0.00

Table 12:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 4: Receiver sensitivity = -105 dBm, path loss exponent = 2.7
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-90
TX Power (W)	20
Band	UHF-Band
Lower Frequency (MHz)	300
Upper Frequency (MHz)	320
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.7

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
20000	0.23	0.00
21000	0.23	0.00
22000	0.23	0.00
23000	0.23	0.00
24000	0.23	0.00
25000	0.23	0.00
26000	0.23	0.00
27000	0.23	0.00
27100	0.23	0.00
27200	0.23	0.00
27300	0.23	0.00
27400	0.23	0.00

27500	0.23	0.00
27600	0.23	0.00
27700	0.23	0.00
27800	0.23	0.00
27900	0.00	0.00
28000	0.00	0.00

Table 13:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 5: Receiver sensitivity = -110 dBm, path loss exponent = 2.7

Settings

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-90
TX Power (W)	20
Band	UHF-Band
Lower Frequency (MHz)	300
Upper Frequency (MHz)	320
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.7

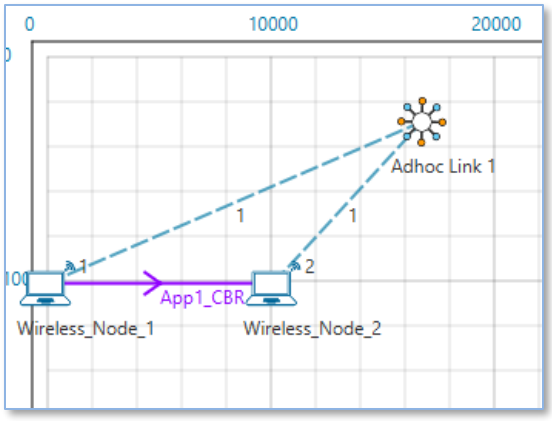
Results

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC- True
25000	0.23	0.00
26000	0.23	0.00
27000	0.23	0.00
28000	0.23	0.00
29000	0.23	0.00
30000	0.23	0.00
31000	0.23	0.01
32000	0.23	0.03
33000	0.20	0.13
34000	0.16	0.37
35000	0.06	0.82
36000	0.01	0.99
37000	0.00	1.00
38000	0.00	1.00

Table 14:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

4. Transmission Range: L-Band

Scenario:



Case 1: Receiver sensitivity = -90 dBm, pathloss exponent = 2.4
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-90
TX Power (W)	20
Band	L-Band
Lower Frequency (MHz)	1000
Upper Frequency (MHz)	2000
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.4

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC – True
16000	0.23	0.00
17000	0.23	0.00
18000	0.23	0.00
19000	0.23	0.00
20000	0.23	0.00
21000	0.23	0.00
22000	0.23	0.00
22100	0.23	0.00
22200	0.23	0.00
22300	0.23	0.00
22400	0.23	0.00
22500	0.23	0.00
22600	0.23	0.00
22700	0.23	0.00
22800	0.00	0.00

22900	0.00	0.00
23000	0.00	0.00

Table 15:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 2: Receiver sensitivity = -95 dBm, path loss exponent = 2.4
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-90
TX Power (W)	20
Band	L-Band
Lower Frequency (MHz)	1000
Upper Frequency (MHz)	2000
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.4

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC – True
30000	0.23	0.00
31000	0.23	0.00
32000	0.23	0.00
33000	0.23	0.00
34000	0.23	0.00
35000	0.23	0.00
36000	0.23	0.00
36100	0.23	0.00
36200	0.23	0.00
36300	0.23	0.00
36400	0.23	0.00
36500	0.23	0.00
36600	0.23	0.00
36700	0.00	0.00
36800	0.00	0.00

Table 16:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 3: Receiver sensitivity = -100 dBm, path loss exponent = 2.5
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-90
TX Power (W)	20

Band	L-Band
Lower Frequency (MHz)	1000
Upper Frequency (MHz)	2000
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.4

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC – True
35000	0.23	0.00
36000	0.23	0.00
37000	0.23	0.00
38000	0.23	0.00
38100	0.23	0.00
38200	0.00	0.00
38300	0.00	0.00
38400	0.00	0.00

Table 17:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 4: Receiver sensitivity = -105 dBm, path loss exponent = 2.5
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-90
TX Power (W)	20
Band	L-Band
Lower Frequency (MHz)	1000
Upper Frequency (MHz)	2000
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.4

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC – True
55000	0.23	0.00
56000	0.23	0.00
57000	0.23	0.00

58000	0.23	0.00
59000	0.23	0.00
60000	0.23	0.00
60100	0.23	0.00
60200	0.23	0.00
60300	0.23	0.00
60400	0.23	0.00
60500	0.23	0.00
60600	0.00	0.00
60700	0.00	0.00

Table 18:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 5: Receiver sensitivity = -110 dBm, path loss exponent = 2.5
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-90
TX Power (W)	20
Band	L-Band
Lower Frequency (MHz)	1000
Upper Frequency (MHz)	2000
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.4

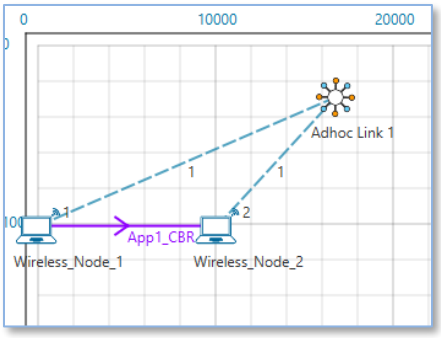
Results

Distance (m)	**Throughput (Mbps) FEC- True**	**Packet Error Rate FEC – True**
60000	0.23	0.00
62000	0.23	0.00
64000	0.23	0.00
66000	0.23	0.00
68000	0.23	0.01
70000	0.23	0.03
72000	0.21	0.09
74000	0.18	0.24
76000	0.12	0.53
78000	0.05	0.89
80000	0.00	0.99
80500	0.00	1.00
81000	0.00	1.00

Table 19:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

5. Transmission Range: S-Band

Scenario:



Case 1: Receiver sensitivity = -90 dBm, pathloss exponent = 2.1
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-90
TX Power (W)	20
Band	S-Band
Lower Frequency (MHz)	2000
Upper Frequency (MHz)	4000
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.1

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC – True
20000	0.23	0.00
21000	0.23	0.00
22000	0.23	0.00
23000	0.23	0.00
24000	0.23	0.00
25000	0.23	0.00
25100	0.23	0.00
25200	0.23	0.00
25300	0.23	0.00
25400	0.23	0.00
25500	0.23	0.00
25600	0.23	0.00
25700	0.23	0.00
25800	0.23	0.00
25900	0.00	0.00
26000	0.00	0.00

Table 20: Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 2: Receiver sensitivity = -95 dBm, path loss exponent = 2.2
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-95
FEC	True
Band	S-Band
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.2

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC – True
20000	0.23	0.00
21000	0.23	0.00
22000	0.23	0.00
23000	0.23	0.00
24000	0.23	0.00
25000	0.23	0.00
26000	0.23	0.00
27000	0.23	0.00
27100	0.23	0.00
27200	0.23	0.00
27300	0.23	0.00
27400	0.23	0.00
27500	0.23	0.00
27600	0.00	0.00
27700	0.00	0.00

Table 21:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 3: Receiver sensitivity = -100 dBm, path loss exponent = 2.4
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-100
FEC	True
Band	S-band
General	
Mobility	No Mobility
RF Propagation	

Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Pathloss Exponent	2.4

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC – True
15000	0.23	0.00
16000	0.23	0.00
17000	0.23	0.00
18000	0.23	0.00
18100	0.23	0.00
18200	0.23	0.00
18300	0.23	0.00
18400	0.23	0.00
18500	0.23	0.00
18600	0.23	0.00
18700	0.23	0.00
18800	0.23	0.00
18900	0.23	0.00
19000	0.00	0.00

Table 22:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 4: Receiver sensitivity = -105 dBm, path loss exponent = 2.4
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-105
FEC	True
Band	S-Band
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Pathloss only
Pathloss Model	Log Distance
Path loss Exponent	2.4

Results:

Distance (m)	Throughput (Mbps) FEC- True	Packet Error Rate FEC – True
25000	0.23	0.00
26000	0.23	0.00
27000	0.23	0.00
28000	0.23	0.00
29000	0.23	0.00
30000	0.23	0.00
30100	0.23	0.00
30200	0.23	0.00
30300	0.23	0.00

30400	0.23	0.00
30500	0.23	0.00
30600	0.23	0.00
30700	0.00	0.00
30800	0.00	0.00

Table 23:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Case 5: Receiver sensitivity = -110 dBm, path loss exponent = 2.4
Settings:

PHY Layer- DTDMA	
Bandwidth (KHz)	100
Data Symbol Rate (KBd)	100
Receiver Sensitivity (dBm)	-110
FEC	True
Band	S-Band
General	
Mobility	No Mobility
RF Propagation	
Channel characteristics	Path loss only
Path loss Model	Log Distance
Path loss Exponent	2.4

Results

Distance (m)	**Throughput (Mbps) FEC- True**	**Packet Error Rate FEC – True**
30000	0.23	0.00
31000	0.23	0.00
32000	0.23	0.00
33000	0.23	0.00
34000	0.23	0.01
35000	0.23	0.02
36000	0.22	0.04
37000	0.21	0.12
38000	0.17	0.28
39000	0.12	0.58
40000	0.04	0.91
41000	0.00	0.99
42000	0.00	1.00
43000	0.00	1.00

Table 24:Throughput (Mbps) and Packet Error Rate vs. Distance (m).

Discussion

- When FEC is set to TRUE it attempts to correct packet errors. However, FEC can only correct up to a certain BER limit. Therefore, once BER starts to take impact FEC will start correcting errors. Here one can notice that the throughput drops for FEC-False, while FEC-True allows the system to maintain a throughput level.
- After a certain point, the BER is too high, and throughput is zero since all packets are errored. At this stage FEC cannot correct the errors. Hence throughput with FEC-True also falls to 0.

6. Appendix 1: Download Link

The configuration files (scenario, settings, and other related files) of the examples discussed in this analysis are available for users to import and run in NetSim.

Users can download the files from NetSim's git-repository.
Link: https://github.com/NetSim-TETCOS/Optimum-Range-for-Tactical-Radios-in-DTDMA_v13.3/archive/refs/heads/main.zip

1. Click on the link given and download the folder.
2. Extract the zip folder. The extracted project folder consists of one NetSim Experiments file, namely *Optimum-Range-for-Tactical-Radios-in-DTDMA_v13.3.17.netsimexp*
3. Import per steps given in section 4.9.2 in NetSim User Manual

All the experiments can now be seen folder wise within NetSim > Your Work.