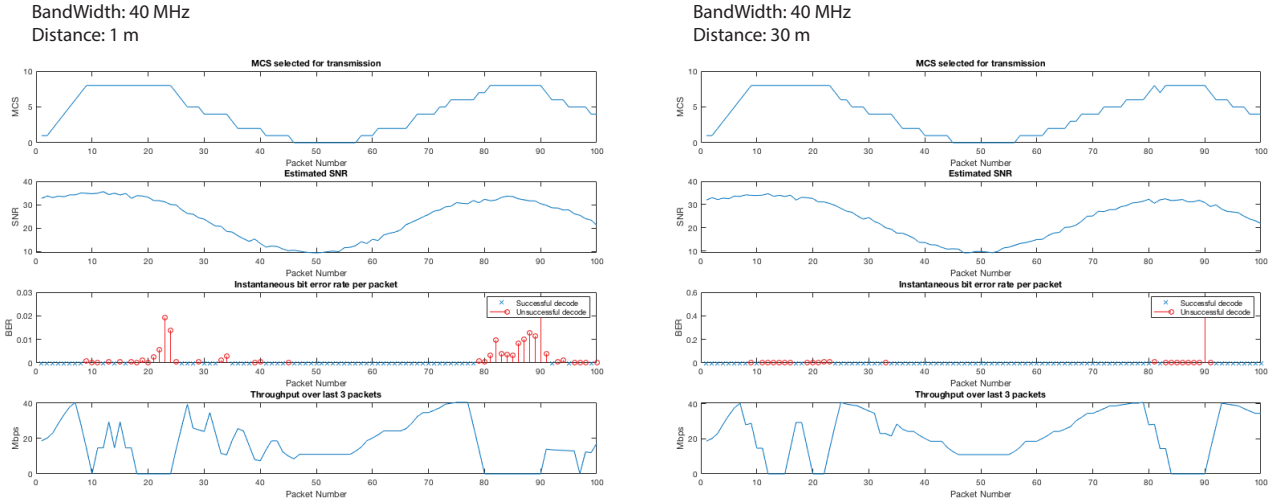


3 Results and interpretation:

In this section the results obtained from different scenarios are compared with the stock algorithm in the example from WLAN Toolbox in matlab. For the initial comparison the delay profile model was changed and tested for distances before and after the breakpoint. Figure 2 shows the result for Model F which has a breakpoint distance of 30m. Table 1 shows the result from other delay profiles. Model D shows a small decrease in performance for the new algorithm. This is because the given code was optimized for this scenario. When averaging the values of the different models, at a distance before the breakpoint there is an improvement of 2.7 Mbps and 8 % reduction in error count. At the breakpoint distance the improvement is 2.02 Mbps in throughput and 7 % reduction in error rate. Individually we see that in model C there is an improvement of 5.8 Mbps and a 22 % reduction in error rate in model F.

Given Algorithm - Delay Profile Model F



Improved Algorithm - Delay Profile Model F

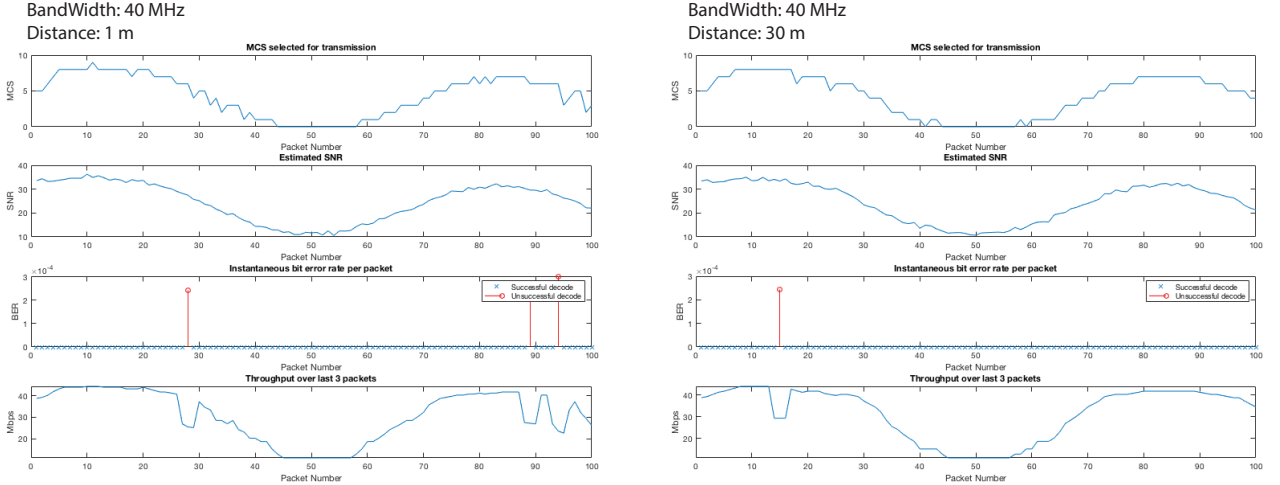


Figure 2: Comparison between given and improved algorithm

Another property that was used to check for improvements with varying channel configuration is the environmental speed. This defines the speed of the scatterers such as dust and humidity. The higher the speed, the more detrimental the effect to the signal. From table 2 ,it can be seen that the new algorithm performs better in more detrimental cases where the scatterer speed is increased.

Table 1: Performance Comparison for Different Delay Profile Models

Distance (in m)		1	5
Model A (Given)	Throughput	24.0984	17.1855
	BER	0	0.12
Model A (Proposed)	Throughput	24.461	22.4021
	BER	0	0
Model B (Given)	Throughput	23.2959	24.524
	BER	0.09	0
Model B (Proposed)	Throughput	25.4821	24.2767
	BER	0	0
Model C(Given)	Throughput	25.9087	28.891
	BER	0.04	0.07
Model C (Proposed)	Throughput	31.077	30.352
	BER	0	0
Model D(Given)	Throughput	29.2646	23.3907
	BER	0.02	0.02
Model D (Proposed)	Throughput	25.624	23.4762
	BER	0	0.01
Model E (Given)	Throughput	26.3504	25.0963
	BER	0.03	0.03
Model E (Proposed)	Throughput	25.8637	25.8782
	BER	0.01	0.01
Model F (Given)	Throughput	16.1078	20.1851
	BER	0.39	0.23
Model F (Proposed)	Throughput	24.8002	24.9964
	BER	0.03	0.01

Table 2: Environmental Speed

Distance(in Km/hr)	Throughput (Given)	Throughput (Proposed)	BER (Given)	BER (Proposed)
0.01	22.7345	25.8921	0.16	0
0.089	20.1851	24.9964	0.23	0.01
0.12	21.0176	24.9446	0.18	0.02
0.2	20.2265	22.6199	0.27	0.06

The case where different waves are passed through the same medium has to be explored as well. When the waveform bandwidth is increased, the throughput should increase as well since more data can be enclosed. This will decrease the bit error rate as well. Since the new algorithm benefits from presence of NACK, the improvement from higher bandwidths are not as high as from lower bandwidths. Another property of the waveform that was tested on is the channel coding. Compared with BCC, no tail bits and padding bits are added for LDPC. Another difference is that multiple FEC (Forward Error Correction) encoders can be used in BCC. The new algorithm shows big improvements in BCC encoding while the improvement in LDPC is only seen from the bit error rate table 3.

Table 3: Channel Coding

Coding Type	Throughput (Given)	Throughput (Proposed)	BER (Given)	BER (Proposed)
BCC	20.1851	24.9964	0.03	0.01
LDPC	26.0297	25.8032	0.01	0

The next property that was tested for, is the guard interval of the transmission. To ensure non-interference from subsequent transmissions there needs to be proper guard interval in place. The greater the interval, the more immune the signal is to reflections and overlaps. Table 4 shows the improvement in throughput and bit error rate for the given and new algorithm. Here again there is significant improvement (4.8 Mbps, 22 less ber).

Table 4: **Guard Interval**

Guard Interval	Throughput (Given)	Throughput (Proposed)	BER (Given)	BER (Proposed)
Long	20.1851	24.9964	0.23	0.01
Short	15.1496	16.3096	0.43	0.34

4 Conclusion:

The algorithm proposed here has a clear advantage when SNR values suddenly change since multiple non-acknowledgements make the down shift more aggressive. This algorithm becomes even more efficient when used along side HARQ (hybrid automatic repeat request). The algorithm prevents multiple NACK to occur simultaneously which prevents overflowing the HARQ buffer. This also means that less retransmissions are required.

In very few scenarios such as with LDPC channel coding the throughput is slightly less than the test case but all scenarios show reduced bit error count. With increasing packet count the probability of bit error count increases, thus making the new algorithm better. From all the scenarios that were run, the best improvement achieved in throughput is 5.8 Mbps and 36% reduction in error count.