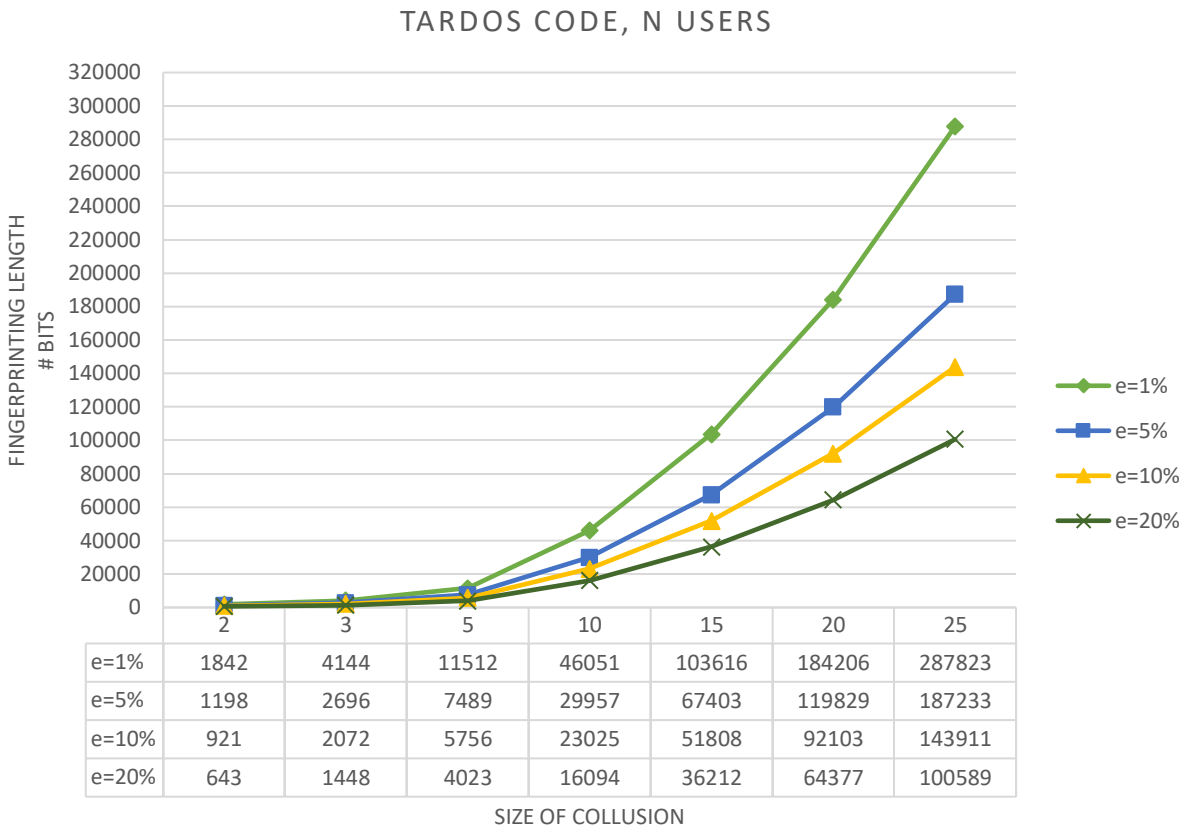
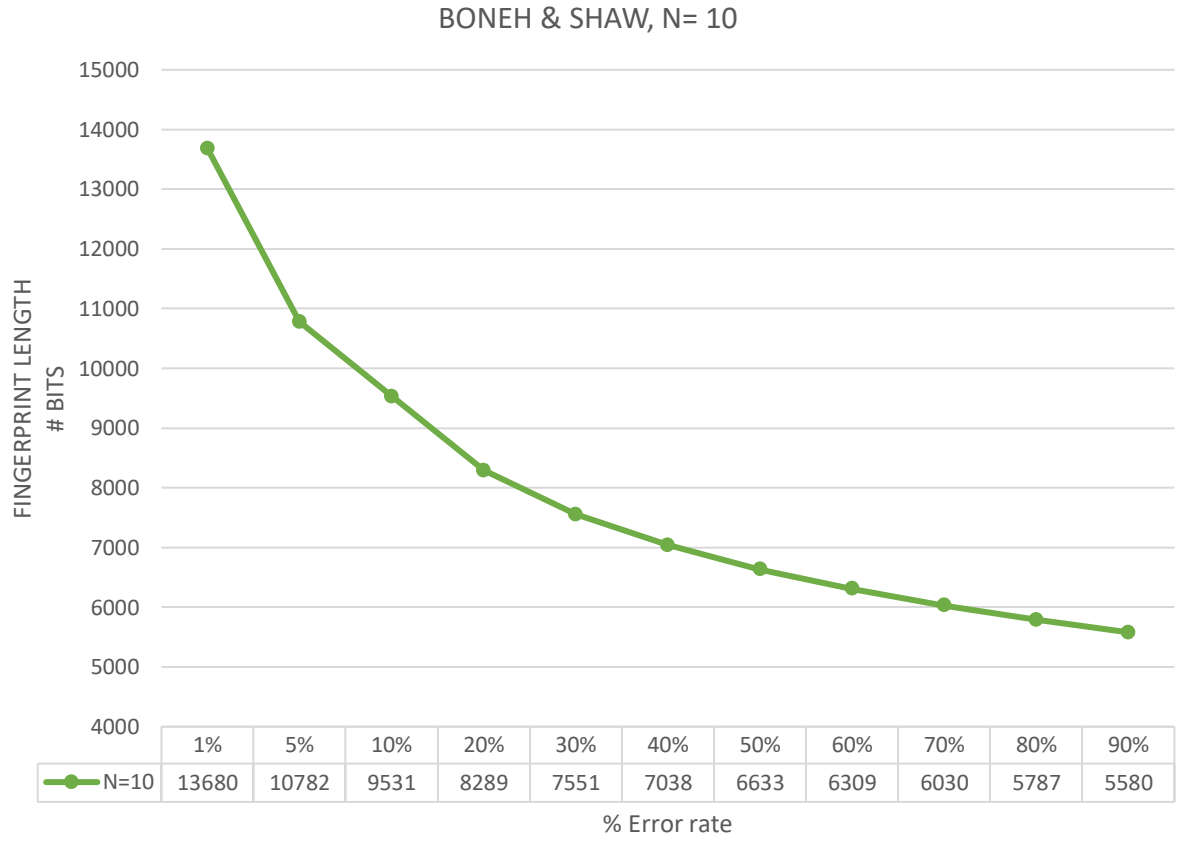
COLLUSION CODE GRAPH



	2	3	5	10	15	20	25
e=1%	1842	4144	11512	46051	103616	184206	287823
e=5%	1198	2696	7489	29957	67403	119829	187233
e=10%	921	2072	5756	23025	51808	92103	143911
e=20%	643	1448	4023	16094	36212	64377	100589



	1%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%
N=10	13680	10782	9531	8289	7551	7038	6633	6309	6030	5787	5580

LSB MODIFICATION

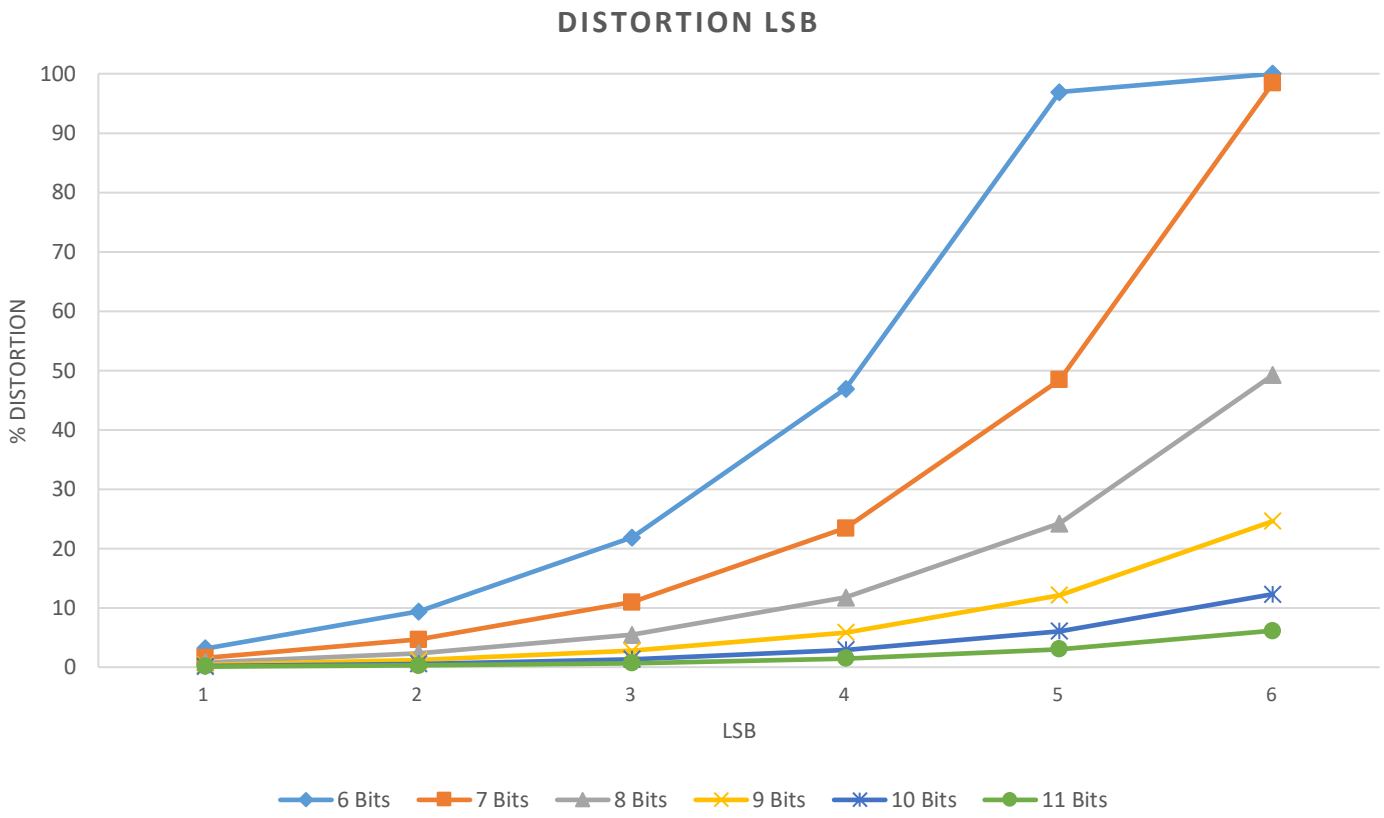
RANDOM BIT INSERTION								
#BITS	A1	A2	A3	A4	A5	A6	TOTAL VALUE	% TUPLE DISTORSION
	31	63	127	255	511	1023	2010	0%
	5	6	7	8	9	10		
1 LSB								
New value	30	62	126	254	510	1022	2009	0.04975124
% Distortion	3.22580645	1.58730159	0.78740157	0.39215686	0.19569472	0.09775171		
2 LSB								
New value	29	61	125	253	509	1021	2008	0.09950249
% Distortion	6.4516129	3.17460317	1.57480315	0.78431373	0.39138943	0.19550342		
3 LSB								
New value	27	59	123	251	507	1019	2006	0.19900498
% Distortion	12.9032258	6.34920635	3.1496063	1.56862745	0.78277886	0.39100684		
5 LSB								
New value	15	47	111	239	495	1007	1994	0.7960199
% Distortion	51.6129032	25.3968254	12.5984252	6.2745098	3.13111546	1.56402737		

LSB MODIFICATION WITH PROPORTIONAL DISTRIBUTION								
#BITS	A1	A2	A3	A4	A5	A6	TOTAL VALUE	% TUPLE DISTORSION
	31	63	127	255	511	1023	2010	0%
	5	6	7	8	9	10		
2 BITS H								
Bits distribution	0	0	0	0	0	2		
New value	31	63	127	255	511	1020	2007	0.14925373
% Distortion	0	0	0	0	0	0.29325513		
3 BITS H								
Bits distribution	0	0	0	0	1	2		
New value	31	63	127	255	510	1020	2006	0.19900498
% Distortion					0.19569472	0.29325513		
5 BITS H								
Bits distribution	0	0	0	0	2	3		
New value	31	63	127	255	508	1016	2000	0.49751244
% Distortion					0.58708415	0.68426197		
7 BITS H								
Bits distribution	0	0	0	1	2	4		
New value	31	63	127	254	508	1008	1991	0.94527363
% Distortion	0	0	0	0.39215686	0.58708415	1.46627566		

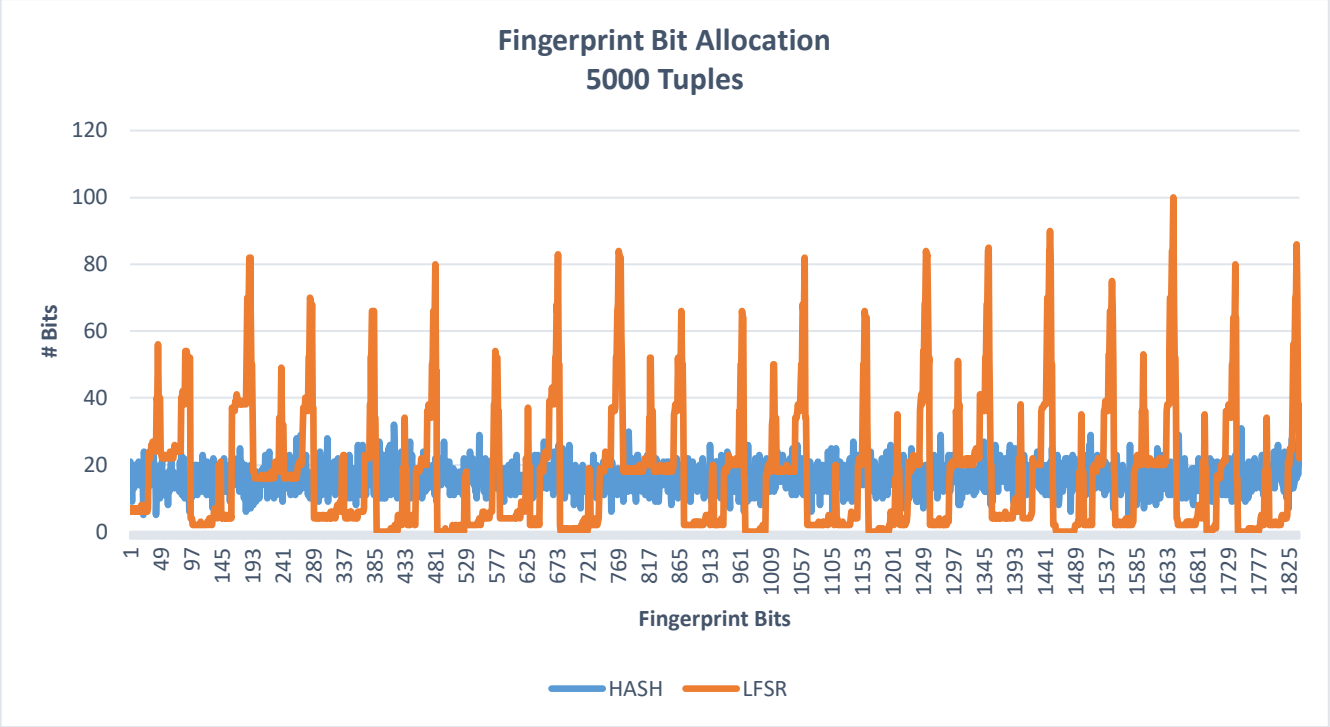
LSB MODIFICATION WITH PROPORTIONAL DISTRIBUTION								
#BITS	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**	**TOTAL VALUE**	**% TUPLE DISTORTION**
	31	**63**	**127**	**255**	**1023**	**1023**	2522	0%
	5	6	7	8	10	10		
2 BITS								
Bits distribution	0	0	0	0	1	1		
New value	31	63	127	255	1022	1022	2520	0.07930214
% Distortion	0	0	0	0	0.09775171	0.09775171		
3 BITS								
Bits distribution	0	0	0	0	1	2		
New value	31	63	127	255	1022	1020	2518	0.15860428
% Distortion					0.09775171	0.29325513		
5 BITS								
Bits distribution	0	0	0	0	2	3		
New value	31	63	127	255	1020	1016	2512	0.39651071
% Distortion					0.29325513	0.68426197		
7 BITS								
Bits distribution	0	0	0	1	2	4		
New value	31	63	127	254	1020	1008	2503	0.75337034
% Distortion	0	0	0	0.39215686	0.29325513	1.46627566		

MODIFICATION BASED ON DISTORTION VALUE

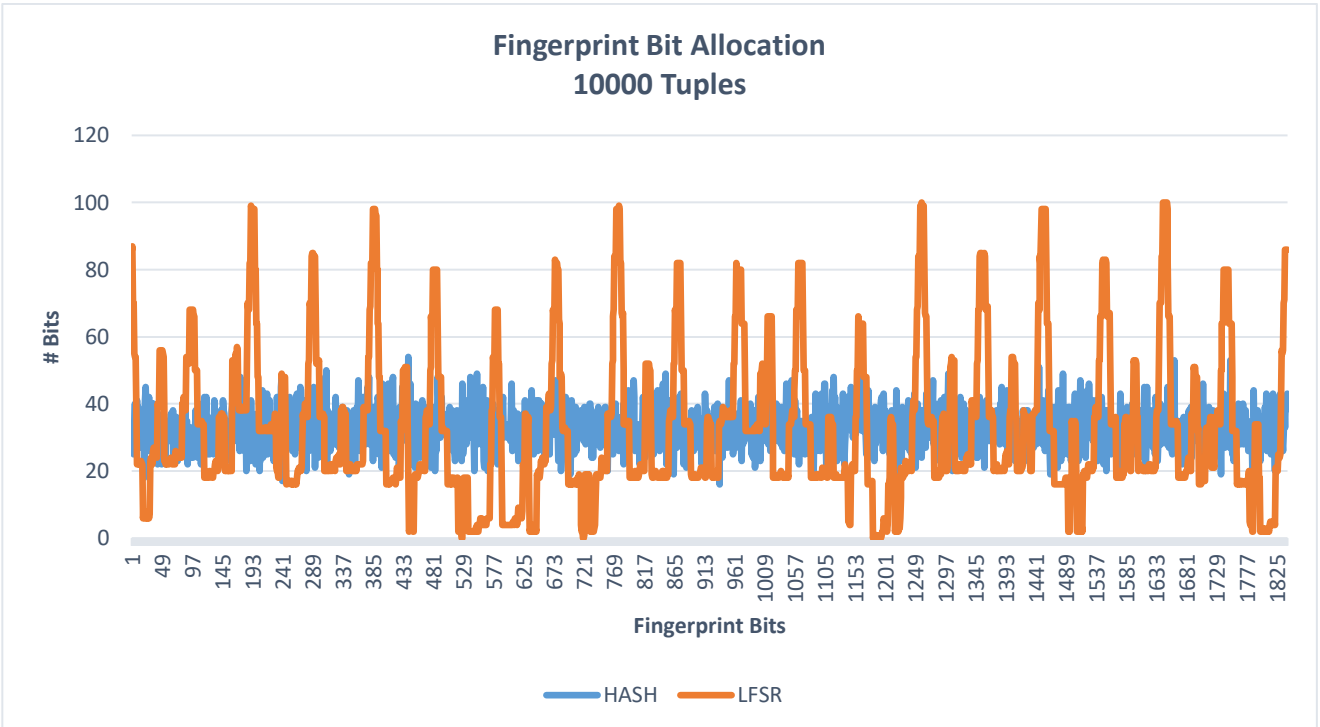
Max value	#Bits	1 LSB		2 LSB		3 LSB		4 LSB		5 LSB		6 LSB	
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
1	1	100	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	2	33.333	50	100	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	3	14.286	25	42.857	75	100	100	N/A	N/A	N/A	N/A	N/A	N/A
15	4	6.667	12.5	20	37.5	46.667	87.5	100	100	N/A	N/A	N/A	N/A
31	5	3.226	6.25	9.677	18.75	22.581	43.75	48.387	93.75	100	100	N/A	N/A
63	6	1.587	3.125	4.762	9.375	11.111	21.875	23.810	46.875	49.206	96.875	100	100
127	7	0.787	1.563	2.362	4.688	5.512	10.938	11.811	23.438	24.409	48.438	49.606	98.438
255	8	0.392	0.781	1.176	2.344	2.745	5.469	5.882	11.719	12.157	24.219	24.706	49.219
511	9	0.196	0.391	0.587	1.172	1.370	2.734	2.935	5.859	6.067	12.109	12.329	24.609
1023	10	0.098	0.195	0.293	0.586	0.684	1.367	1.466	2.930	3.030	6.055	6.158	12.305
2047	11	0.049	0.098	0.147	0.293	0.342	0.684	0.733	1.465	1.514	3.027	3.078	6.152
4095	12	0.024	0.049	0.073	0.146	0.171	0.342	0.366	0.732	0.757	1.514	1.538	3.076



LFSR & HASH FUNTION (SHA-256)



	Mean	Standard Desviation	# Bits	# Bits not inserted
LFSR	16.286	13.979	1647	195
SHA256	16.286	3.201	1842	0



	Mean	Standard Desviation	# Bits	# Bits not inserted
LFSR	32.573	17.206	1828	14
SHA256	32.573	4.664	1842	0