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Project Goal

Evaluate various general-purpose processors in Radar Signal Processing

- Requires processing of complex data types
- All processors have SIMD capability

Freescale 744x (G4) is popular, but several potential alternatives have become available recently

NOT evaluated for this project: DSP chips, FPGA solutions

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Configurations

	AMD Opteron	Broadcom BCM1250	IBM PowerPC 970	Motorola/ Freescale PowerPC 7447 (G4)
Frequency	1.8 GHz	800 MHz	1.8 GHz	1.0 GHz
On-chip cache (L1)	64 Kbytes	32 Kbytes	32 Kbytes	32 Kbytes
On-chip cache (L2)	1024 Kbytes	512 Kbytes (shared by processors)	512 Kbytes	512 Kbytes
L3 Cache	None	None	None	None
Memory Controller	Dual-channel on-chip	Dual-channel on-chip	Apple dual channel, external	Discovery II single channel
DRAM	128 bits, 133 MHz DDR (PC2100)	128 bits, 133 MHz DDR (PC2100)	128 bits, 200 MHz DDR (PC3200)	64 bits, 133 MHz DDR (PC2100)
Comments		Dual processors on chip	Apple dual-processor SMP configuration	

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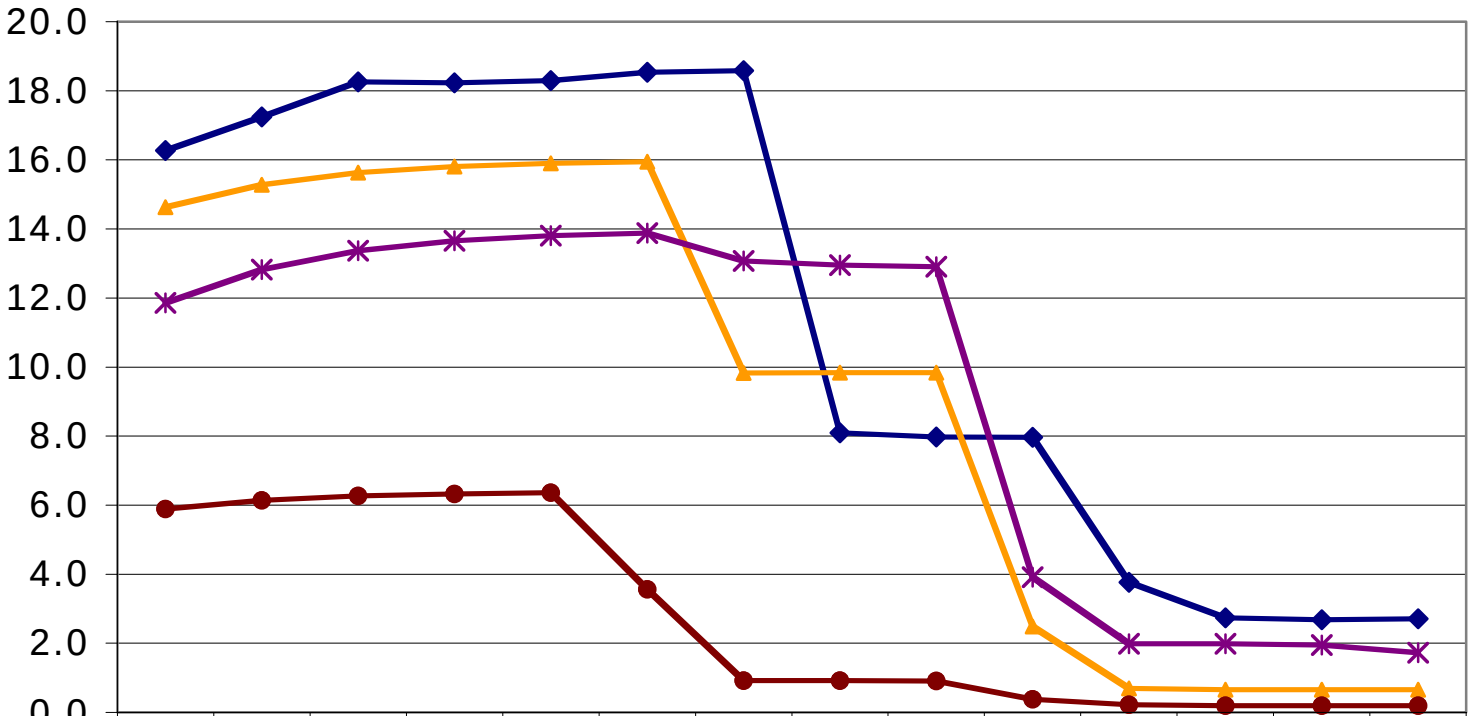
Memory Read Bandwidth



	1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192
1.8 GHz Opteron	16.3	17.2	18.3	18.2	18.3	18.5	18.6	8.09	7.98	7.97	3.77	2.74	2.68	2.71
1 GHz 7447	14.6	15.3	15.6	15.8	15.9	15.9	9.83	9.84	9.83	2.49	0.70	0.66	0.66	0.66
1.8 GHz 970	11.9	12.8	13.4	13.7	13.8	13.9	13.1	13.0	12.9	3.91	1.99	1.99	1.95	1.72
800 MHz Broadcom	5.89	6.13	6.26	6.33	6.36	3.56	0.91	0.91	0.91	0.38	0.23	0.20	0.20	0.20

Length (KBytes)

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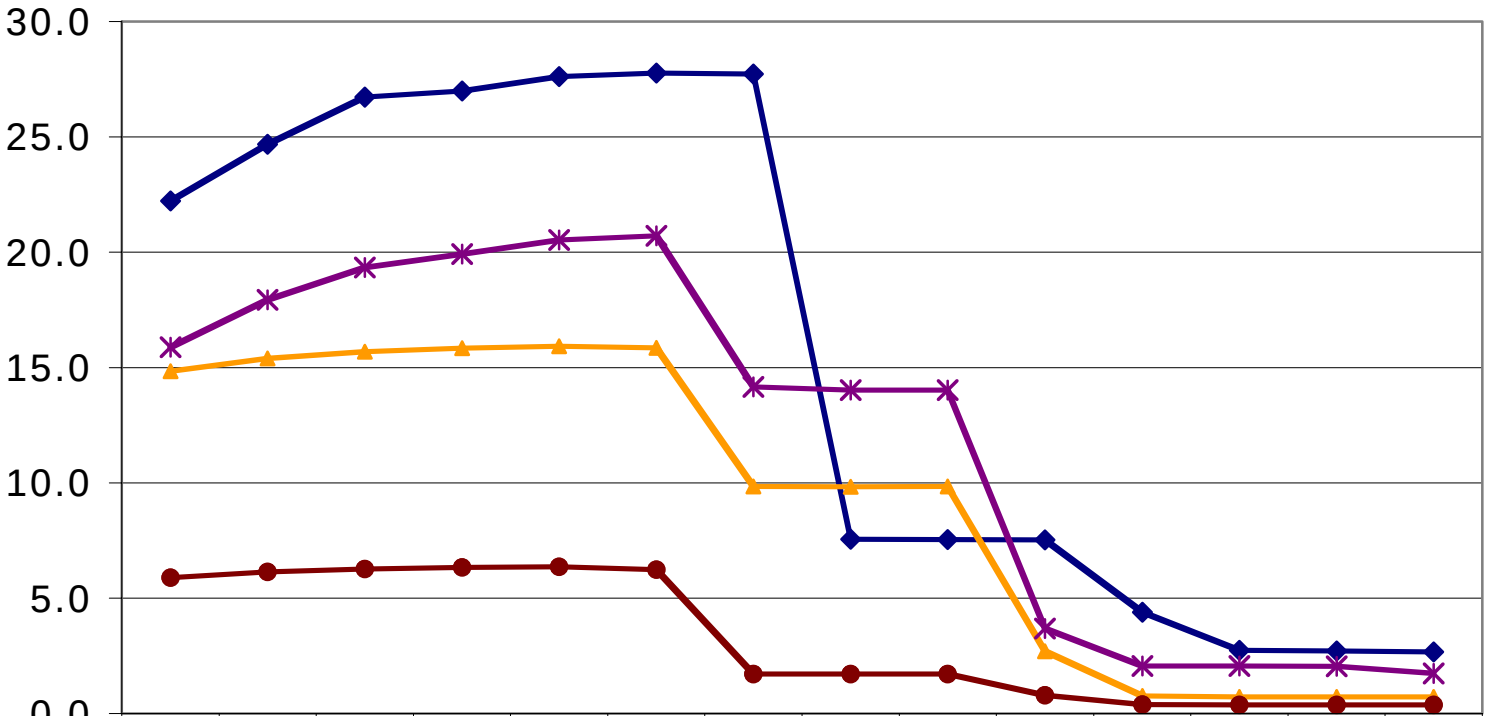
Read Bandwidth - Unrolled



	1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192
1.8 GHz Opteron	22.2	24.7	26.7	27.0	27.6	27.8	27.7	7.55	7.55	7.53	4.38	2.74	2.70	2.67
1 GHz 7447	14.8	15.4	15.7	15.8	15.9	15.9	9.84	9.83	9.84	2.70	0.76	0.73	0.73	0.73
1.8 GHz 970	15.9	17.9	19.3	19.9	20.5	20.7	14.2	14.0	14.0	3.68	2.06	2.06	2.04	1.74
800 MHz Broadcom	5.89	6.14	6.27	6.33	6.37	6.24	1.71	1.71	1.71	0.79	0.39	0.38	0.38	0.37

Length (KBytes)

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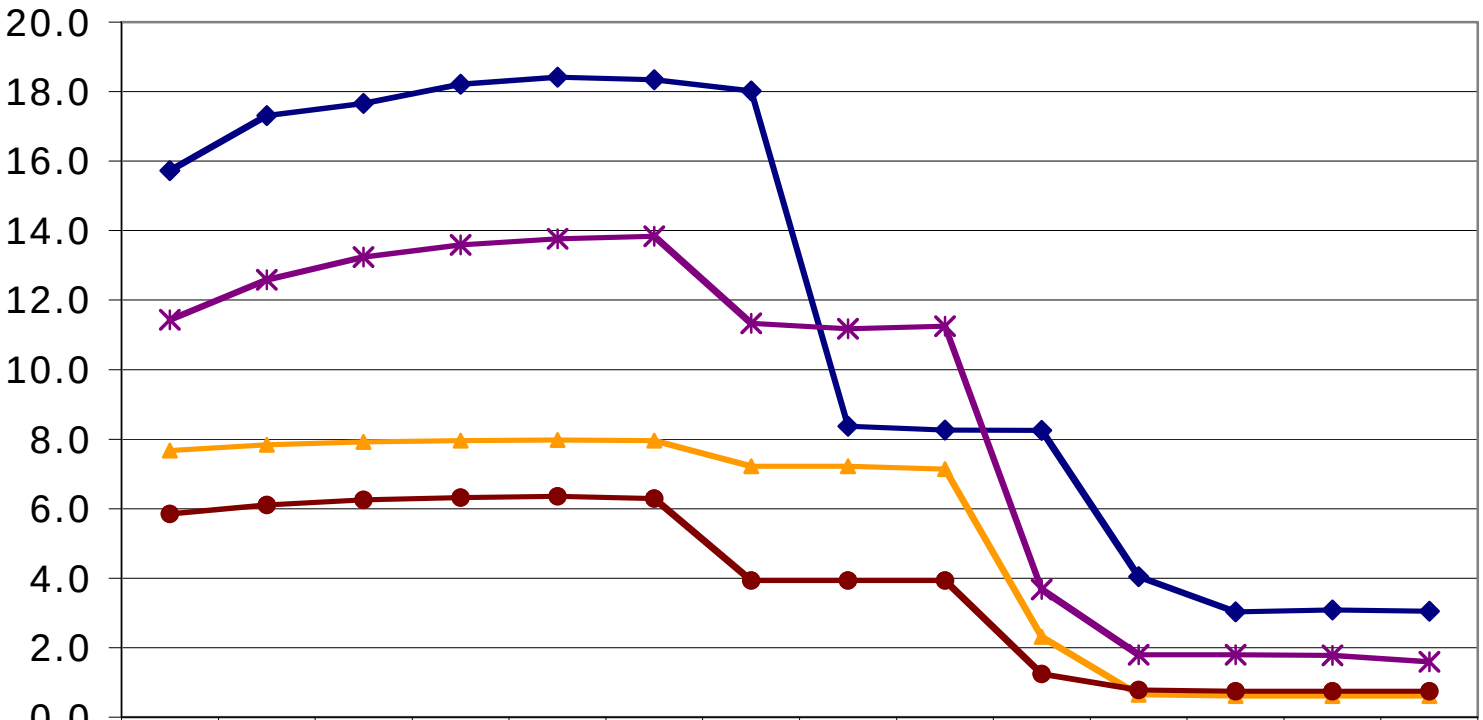
Read Bandwidth with Pre-Fetch



	1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192
1.8 GHz Opteron	15.7	17.3	17.7	18.2	18.4	18.3	18.0	8.37	8.27	8.25	4.04	3.03	3.09	3.05
1 GHz 7447	7.7	7.8	7.9	8.0	8.0	8.0	7.22	7.22	7.14	2.31	0.65	0.61	0.60	0.60
1.8 GHz 970	11.4	12.6	13.2	13.6	13.8	13.8	11.3	11.2	11.3	3.68	1.79	1.80	1.78	1.60
800 MHz Broadcom	5.85	6.11	6.25	6.32	6.35	6.29	3.93	3.94	3.94	1.24	0.79	0.75	0.75	0.74

Length (KBytes)

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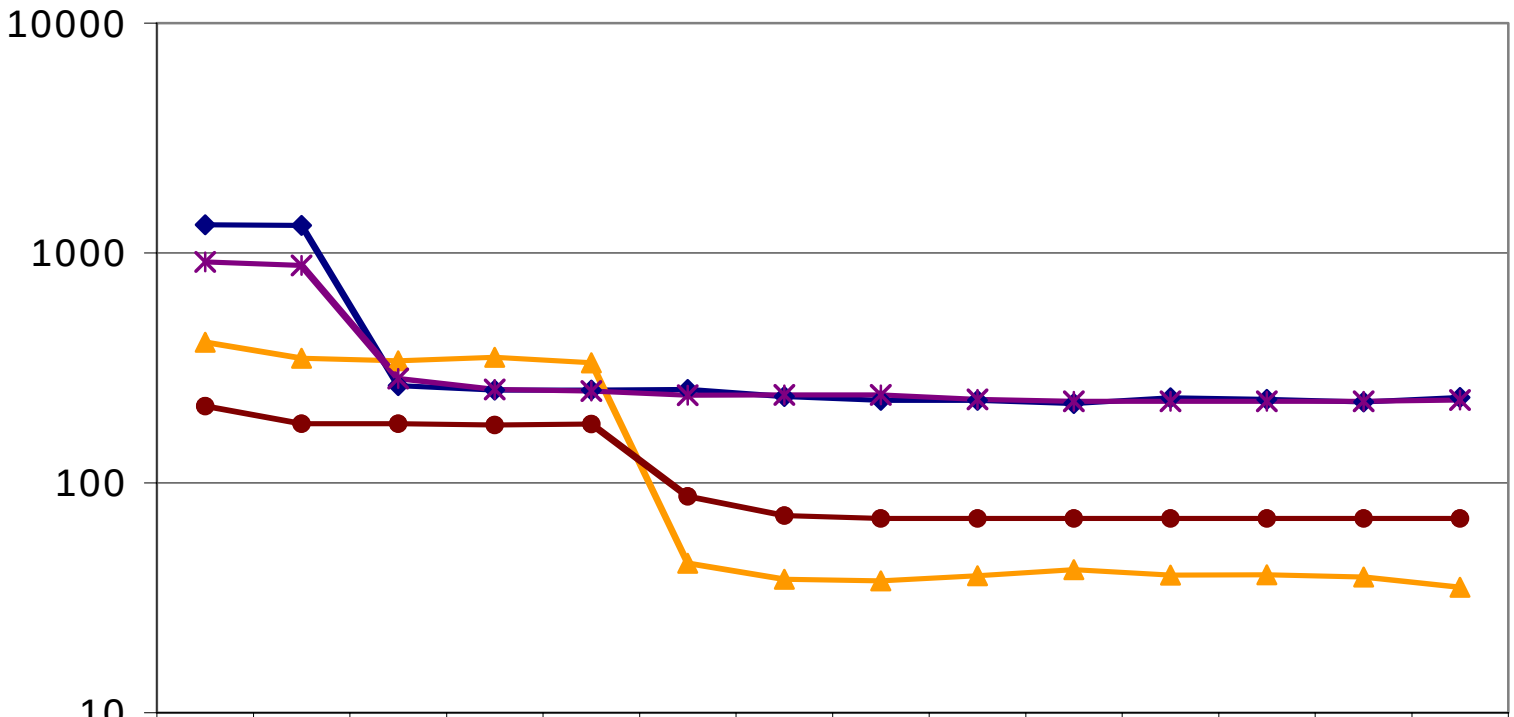
Complex Vector Multiply - Scalar C



	1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192
1.8 GHz Opteron	1325	1319	265	254	253	255	238	229	229	222	235	231	225	236
1 GHz 7447	409	349	340	351	333	45	38	37	39	42	40	40	39	35
1.8 GHz 970	915	881	284	255	251	241	241	242	231	227	227	226	227	230
800 MHz Broadcom	216	181	181	179	180	88	72	70	70	70	70	70	70	70

Length (K elements)

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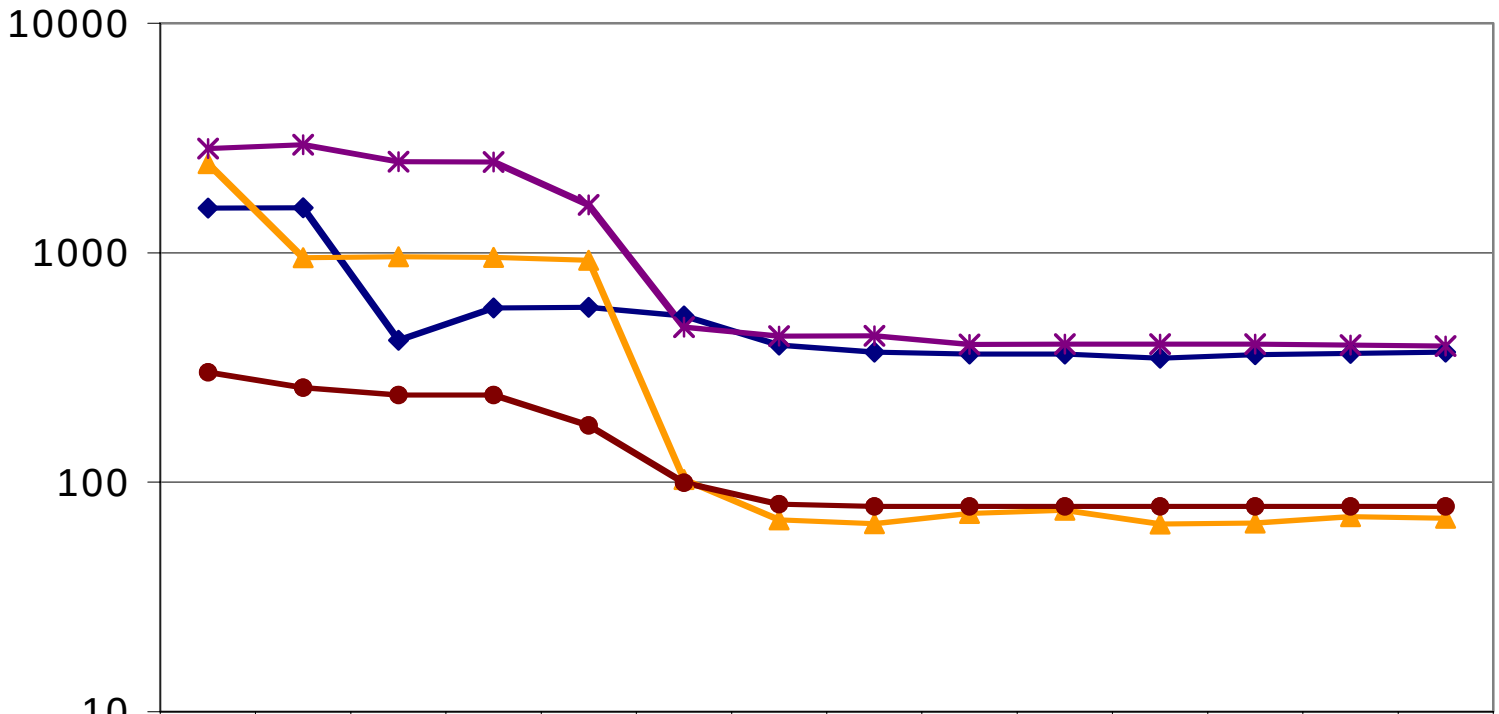
Complex Vector Multiply using SIMD



	1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192
1.8 GHz Opteron	1566	1570	415	575	578	530	396	369	362	362	347	359	365	369
1 GHz 7447	2446	953	961	954	928	103	69	66	73	76	66	66	71	70
1.8 GHz 970	2849	2957	2492	2490	1619	474	433	435	398	400	400	400	396	392
800 MHz Broadcom	301	258	240	240	177	100	80	78	78	78	78	78	78	78

Length (K elements)

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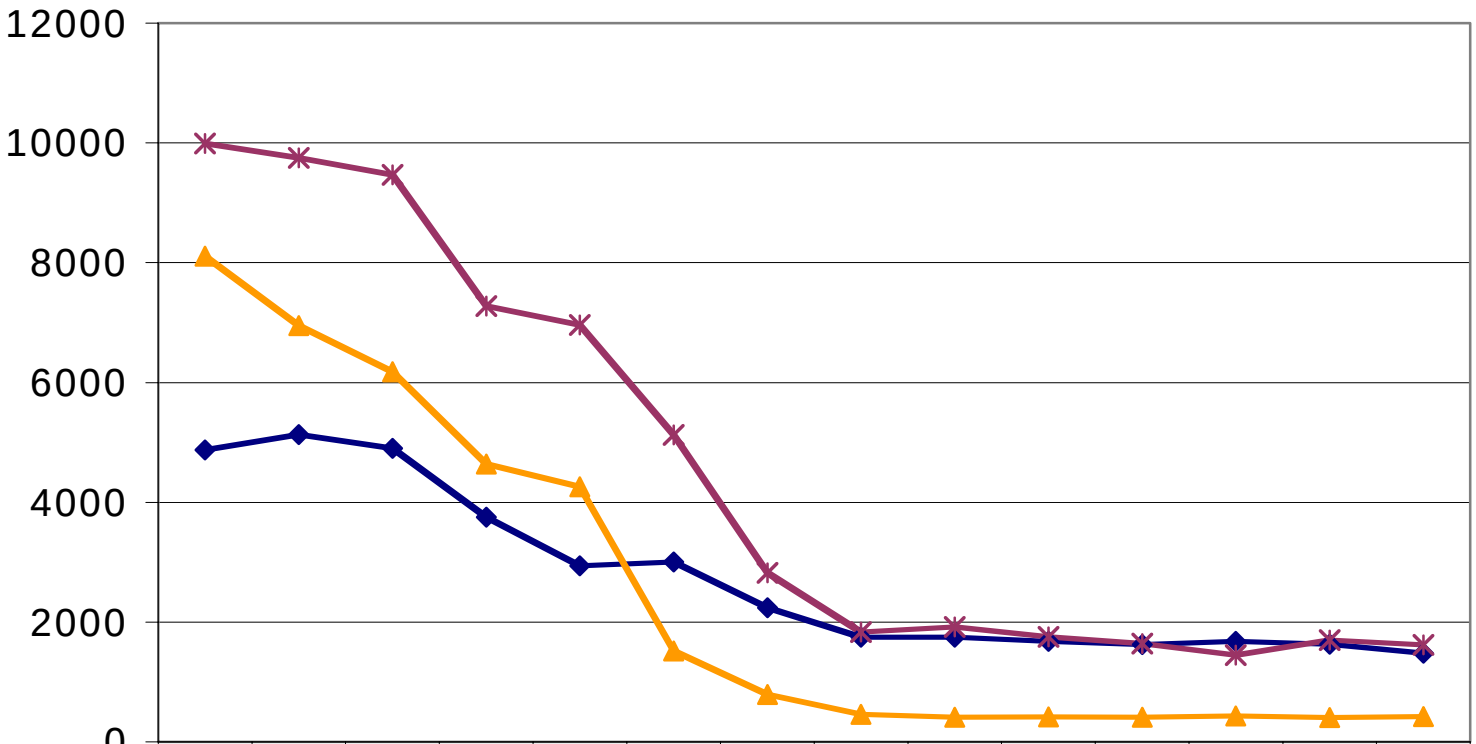
Signal Processing



	1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192
1.8 GHz Opteron	4874	5130	4904	3754	2939	3007	2240	1747	1746	1680	1625	1678	1629	1483
1 GHz 7447	8110	6951	6178	4642	4260	1520	792	461	413	419	409	434	407	424
1.8 GHz 970	9992	9750	9464	7273	6958	5127	2824	1836	1919	1753	1641	1447	1701	1619

Length (K elements)