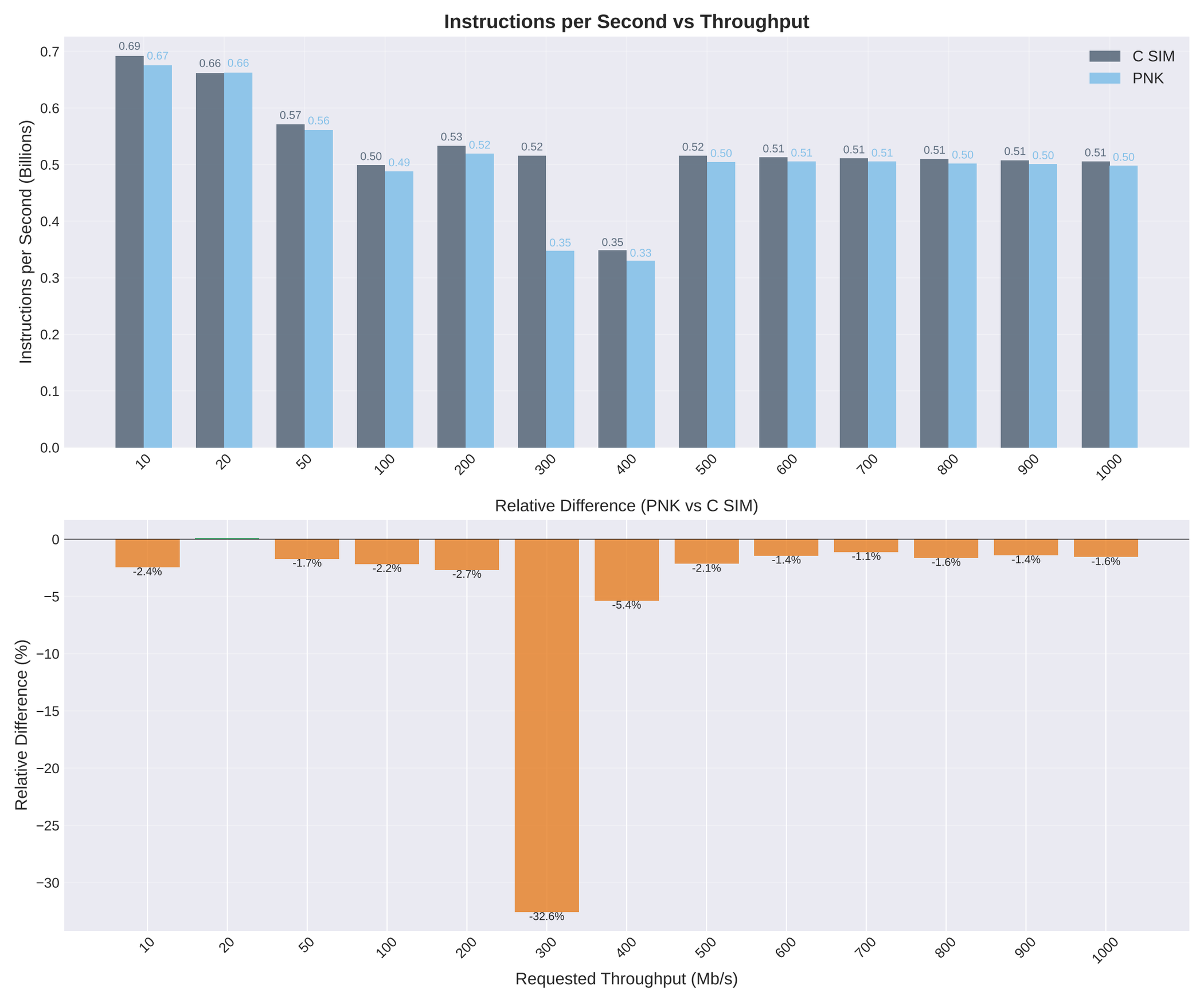
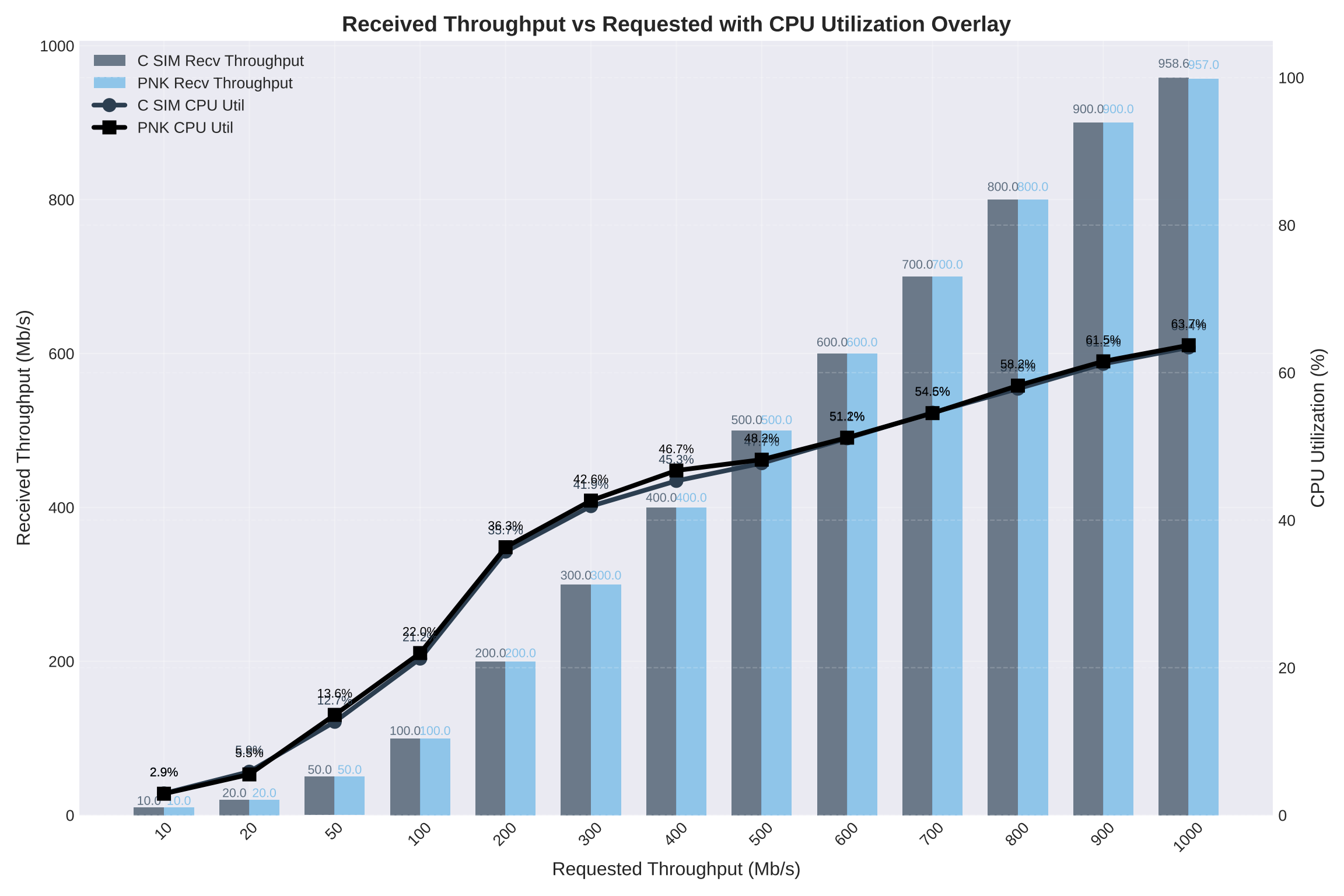
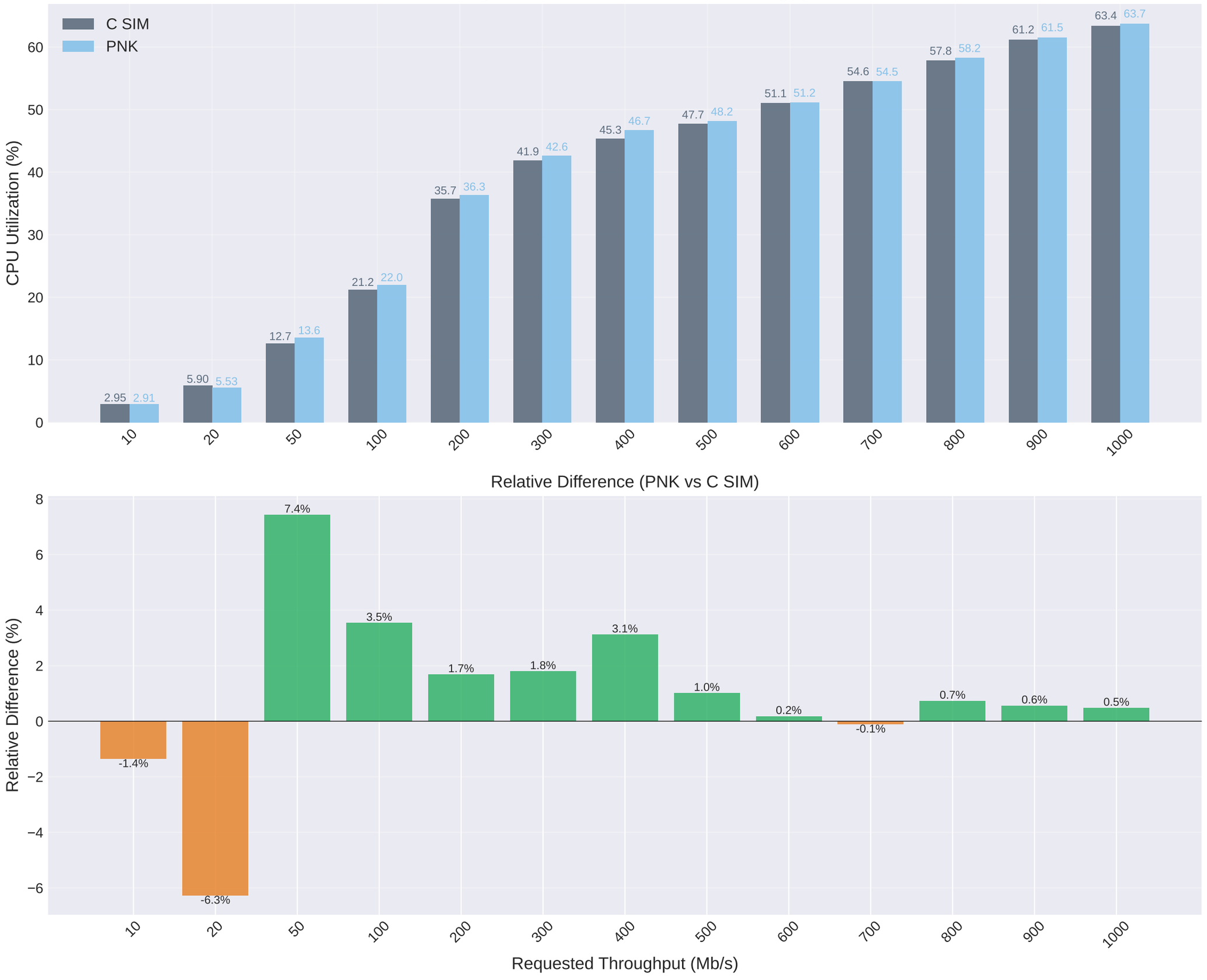
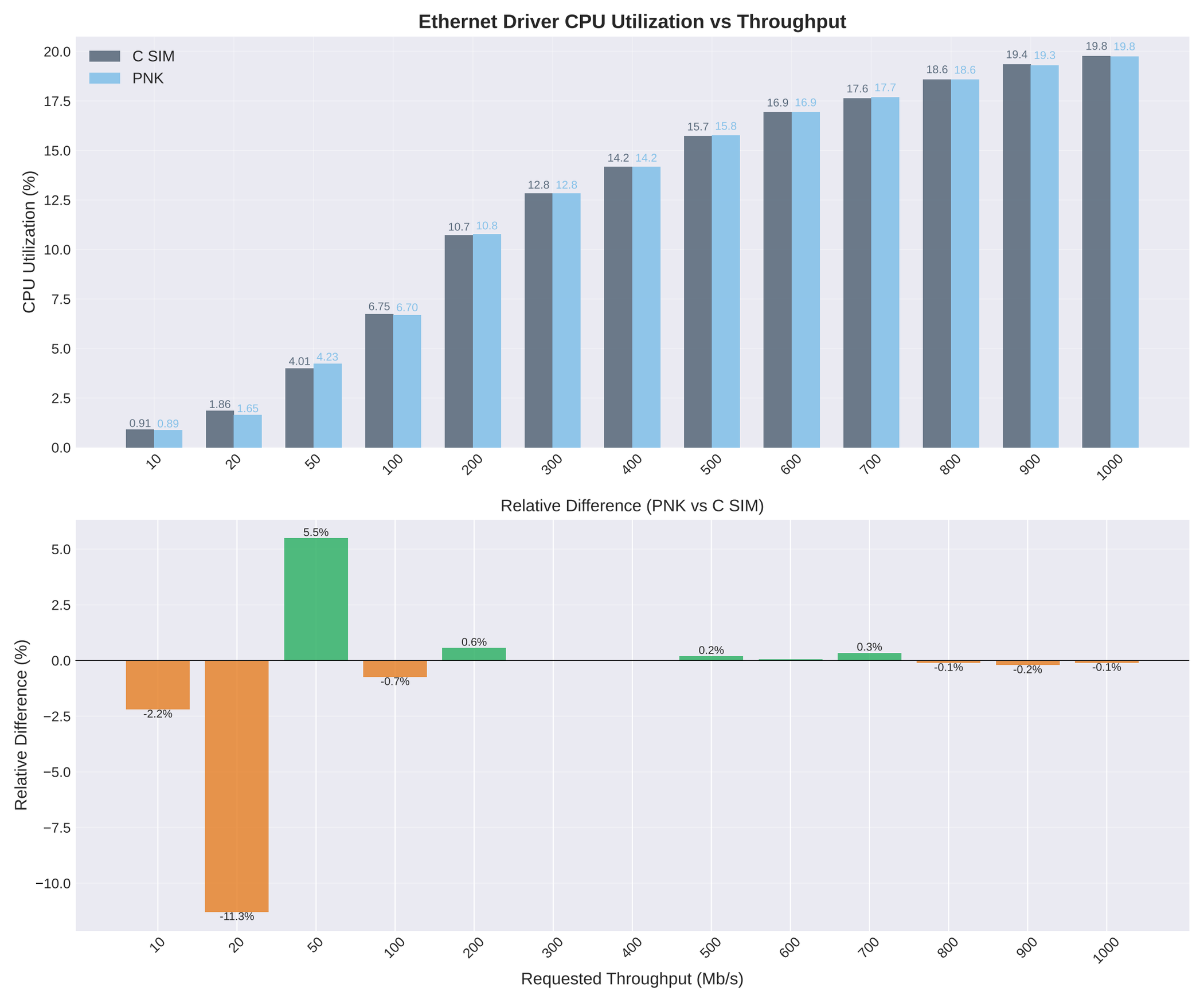

Instructions per Second vs Throughput
Instructions per Second (Billions)
C SIM
PNK
0.69 0.67
0.66 0.66
0.57 0.56
0.50 0.49
0.53 0.52
0.52 0.35
0.35 0.33
0.52 0.50
0.51 0.51
0.51 0.51
0.51 0.50
0.51 0.50
0.51 0.50
10 20 50 100 200 300 400 500 600 700 800 900 1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
-2.4% -1.7% -2.2% -2.7% -32.6% -5.4% -2.1% -1.4% -1.1% -1.6% -1.4% -1.6%
Requested Throughput (Mb/s)

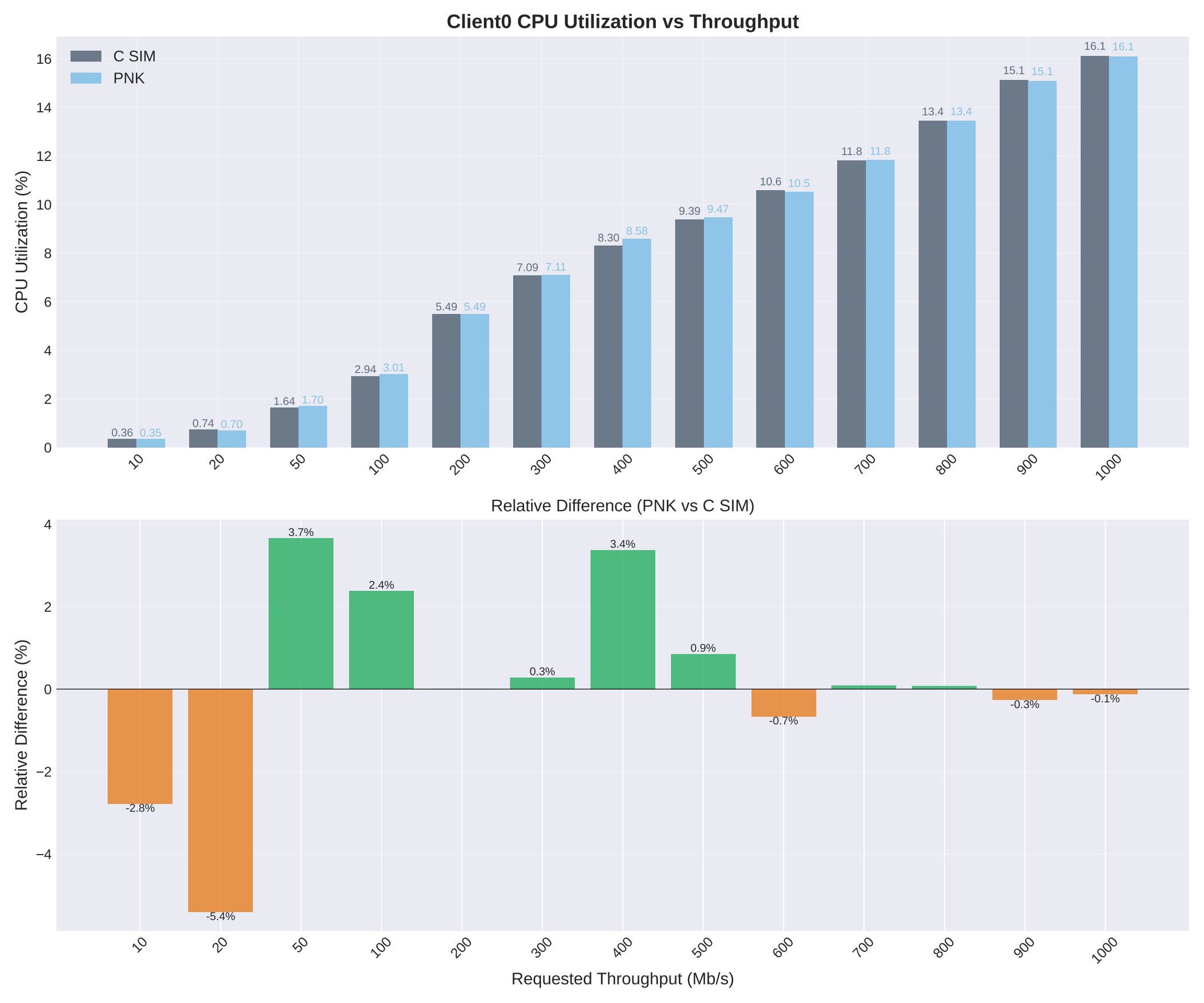

Received Throughput vs Requested with CPU Utilization Overlay
C SIM Recv Throughput
PNK Recv Throughput
C SIM CPU Util
PNK CPU Util
Received Throughput (Mb/s)
CPU Utilization (%)
Requested Throughput (Mb/s)
0
200
400
600
800
1000
0
20
40
60
80
100
10
20
50
100
200
300
400
500
600
700
800
900
1000
10.0 10.0
20.0 20.0
50.0 50.0
100.0 100.0
200.0 200.0
300.0 300.0
400.0 400.0
500.0 500.0
600.0 600.0
700.0 700.0
800.0 800.0
900.0 900.0
958.6 957.0
2.9%
5.9%
13.6%
22.9%
36.3%
42.6%
46.7%
48.2%
51.2%
54.6%
58.2%
61.5%
63.7%

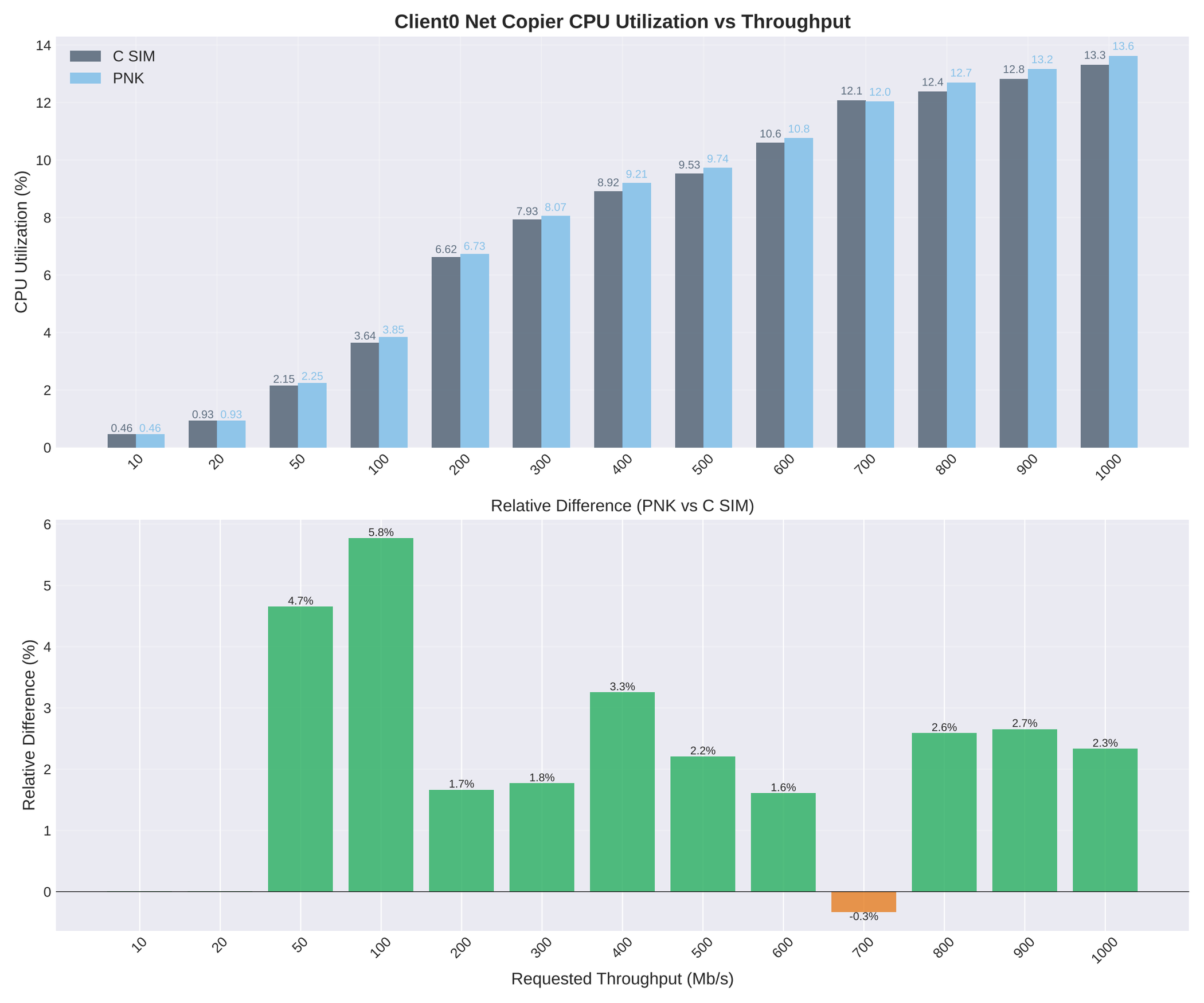

Total System CPU Utilization vs Throughput
C SIM
PNK
CPU Utilization (%)
0
10
20
30
40
50
60
2.95
2.91
5.90
5.53
12.7
13.6
21.2
22.0
35.7
36.3
41.9
42.6
45.3
46.7
47.7
48.2
51.1
51.2
54.6
54.5
57.8
58.2
61.2
61.5
63.4
63.7
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
8
6
4
2
0
−2
−4
−6
-1.4%
-6.3%
7.4%
3.5%
1.7%
1.8%
3.1%
1.0%
0.2%
-0.1%
0.7%
0.6%
0.5%
10
20
50
100
200
300
400
500
600
700
800
900
1000
Requested Throughput (Mb/s)

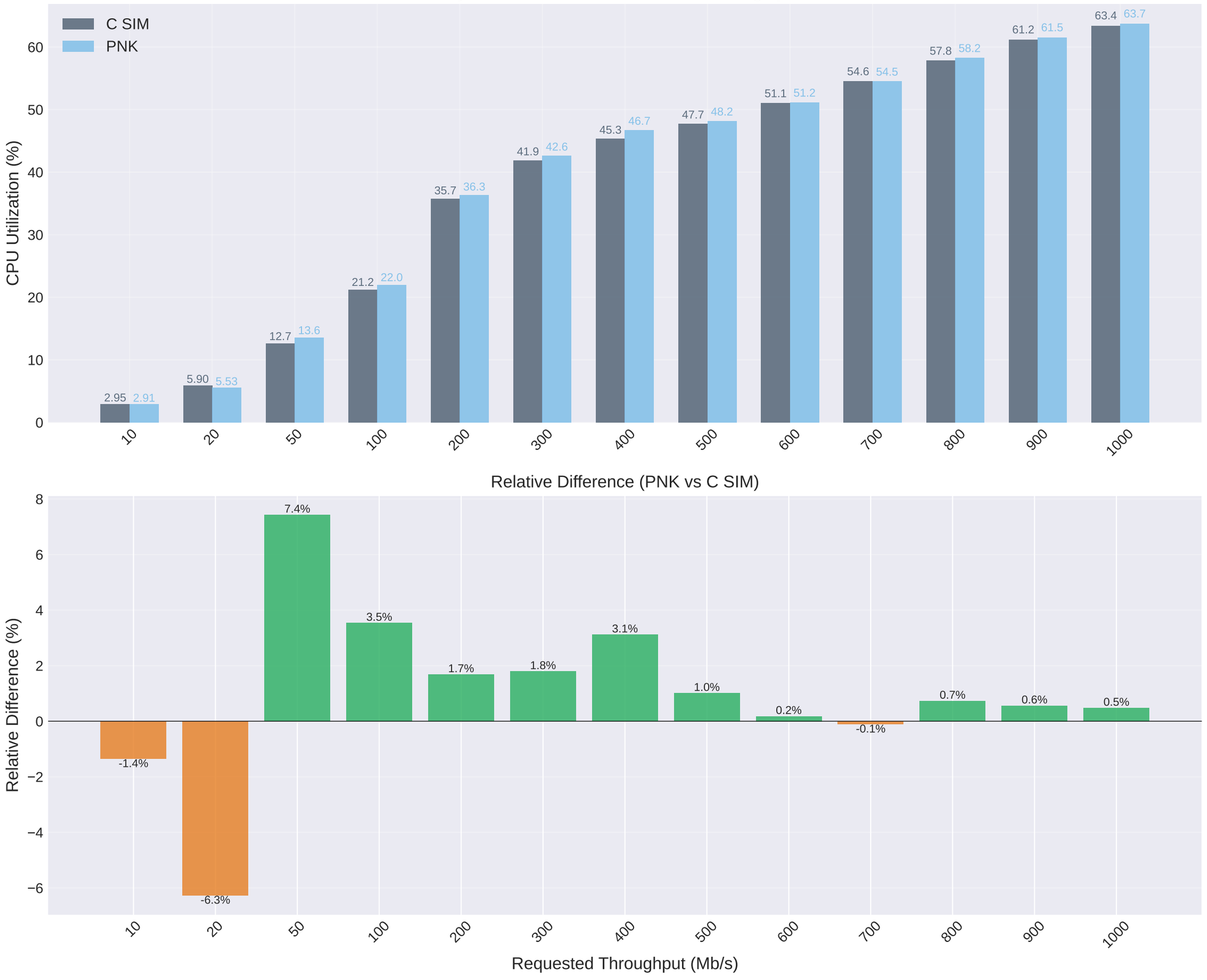

Ethernet Driver CPU Utilization vs Throughput
C SIM
PNK
CPU Utilization (%)
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
0.91 0.89
1.86 1.65
4.01 4.23
6.75 6.70
10.7 10.8
12.8 12.8
14.2 14.2
15.7 15.8
16.9 16.9
17.6 17.7
18.6 18.6
19.4 19.3
19.8 19.8
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
5.0
2.5
0.0
−2.5
−5.0
−7.5
−10.0
-2.2%
-11.3%
5.5%
-0.7%
0.6%
0.2%
0.3%
-0.1%
-0.2%
-0.1%
Requested Throughput (Mb/s)

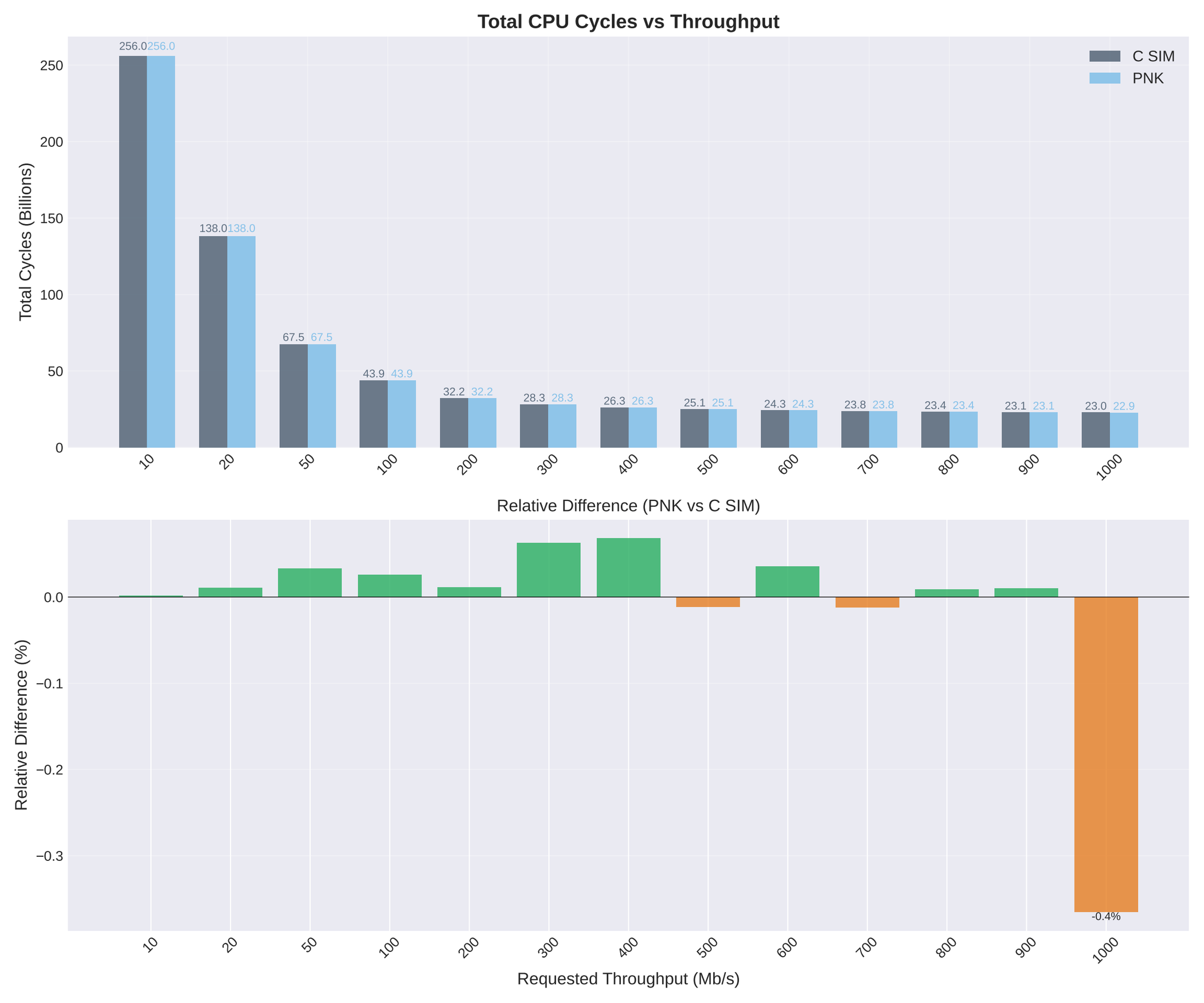
Net Virt TX CPU Utilization vs Throughput
C SIM
PNK
CPU Utilization (%)
0
1
2
3
4
5
6
7
0.38
0.38
0.79
0.70
1.53
1.83
2.54
2.83
4.14
4.37
4.56
4.82
4.38
4.63
4.26
4.17
4.73
4.73
4.87
4.94
5.52
5.55
6.34
6.37
6.67
6.71
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
20
15
10
5
0
−5
−10
19.6%
11.4%
5.6%
5.7%
5.7%
-11.4%
-2.1%
1.4%
0.5%
0.5%
0.6%
10
20
50
100
200
300
400
500
600
700
800
900
1000
Requested Throughput (Mb/s)

Net Virt RX CPU Utilization vs Throughput
C SIM
PNK
CPU Utilization (%)
0
2
4
6
8
0.54 0.54
1.09 1.09
2.53 2.61
4.11 4.34
7.23 7.43
8.21 8.41
8.70 9.43
8.33 8.59
7.77 7.75
7.65 7.49
7.37 7.43
7.03 7.08
6.99 6.99
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
−2
0
2
4
6
8
3.2%
5.6%
2.8%
2.4%
8.4%
3.1%
-0.3%
-2.1%
0.8%
0.7%
10
20
50
100
200
300
400
500
600
700
800
900
1000
Requested Throughput (Mb/s)

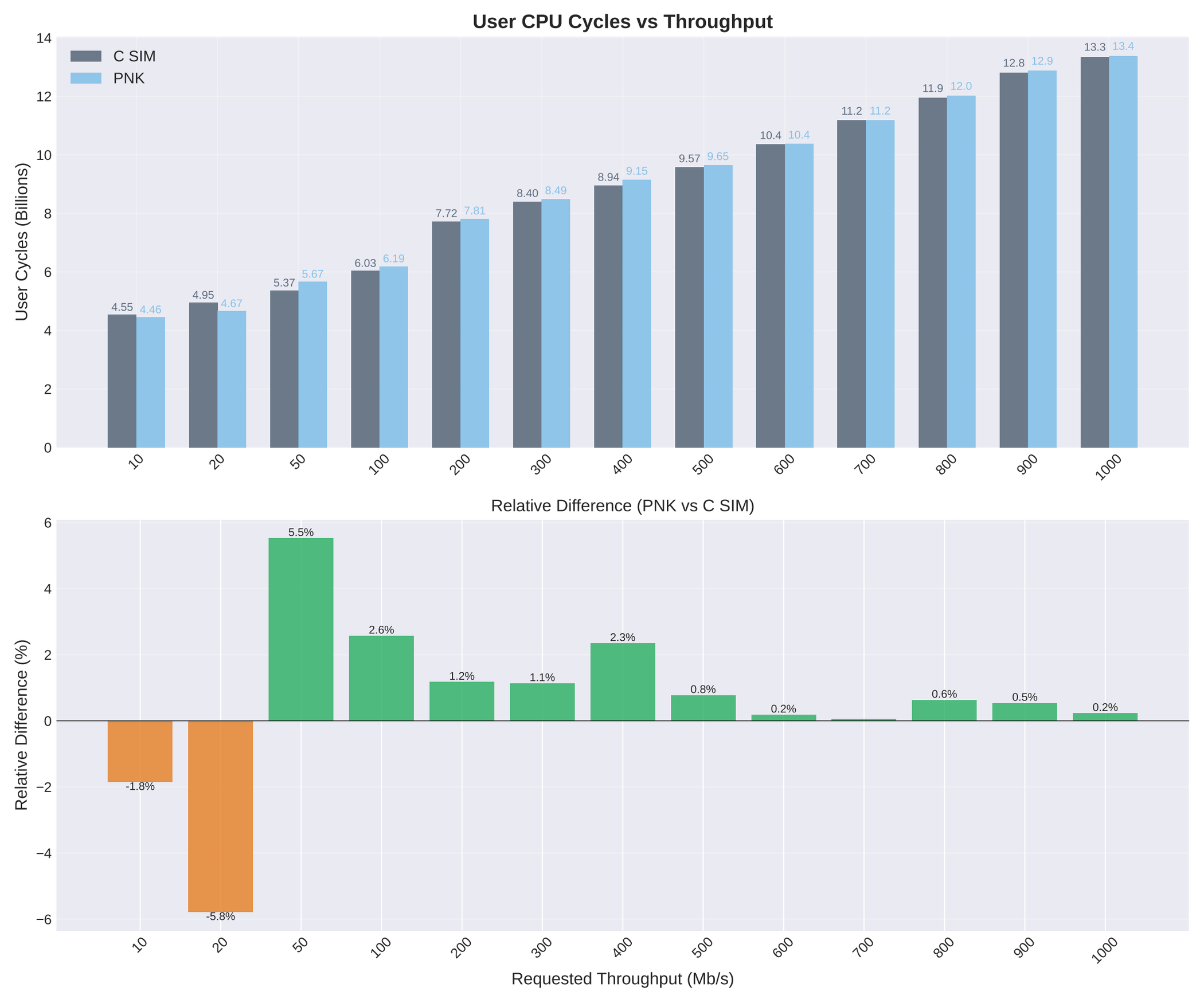

Client0 CPU Utilization vs Throughput
C SIM
PNK
CPU Utilization (%)
0.36 0.35
0.74 0.70
1.64 1.70
2.94 3.01
5.49 5.49
7.09 7.11
8.30 8.58
9.39 9.47
10.6 10.5
11.8 11.8
13.4 13.4
15.1 15.1
16.1 16.1
10 20 50 100 200 300 400 500 600 700 800 900 1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
-2.8%
-5.4%
3.7%
2.4%
0.3%
3.4%
0.9%
-0.7%
-0.3%
-0.1%
Requested Throughput (Mb/s)

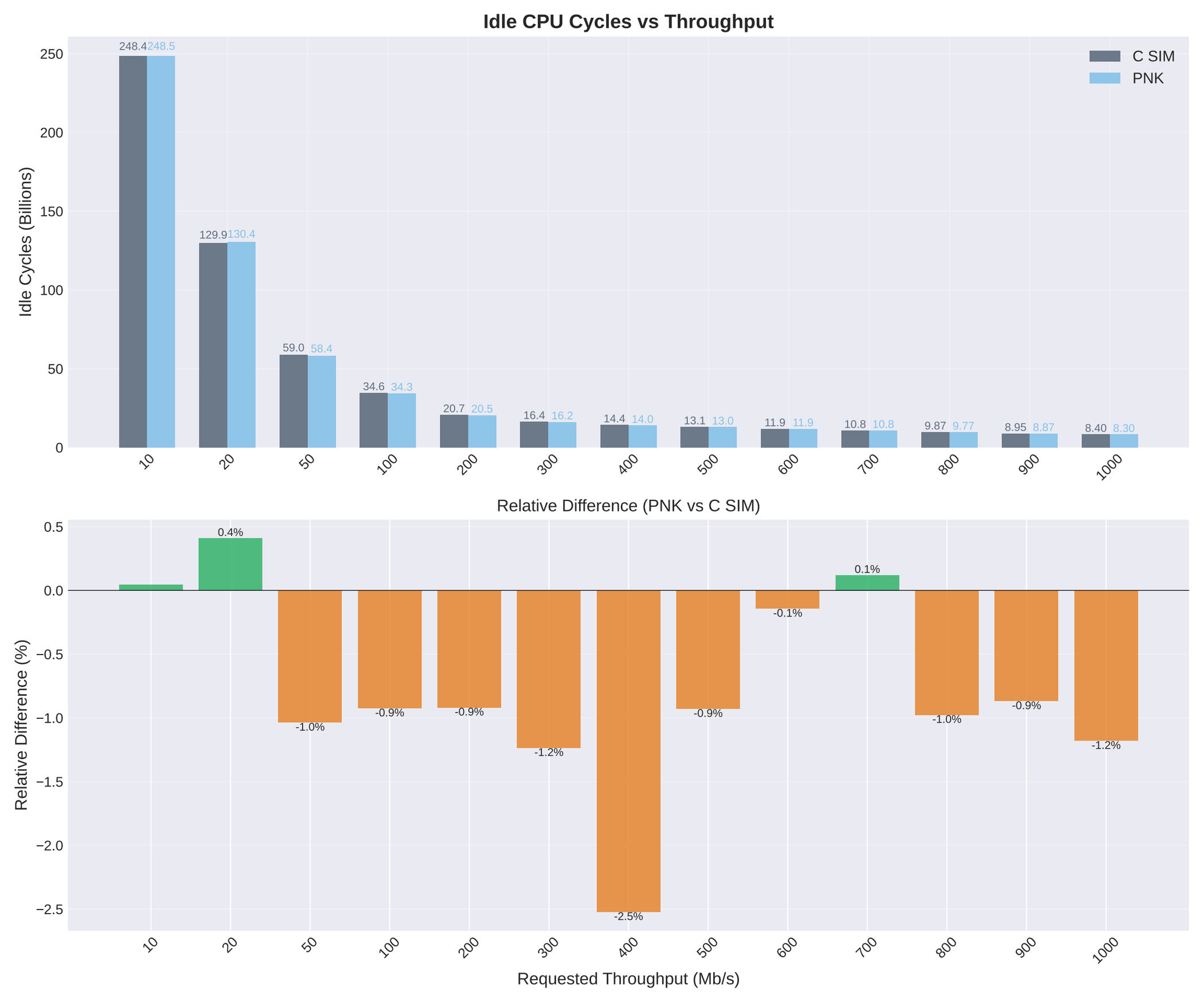

Client0 Net Copier CPU Utilization vs Throughput
C SIM
PNK
CPU Utilization (%)
0
2
4
6
8
10
12
14
0.46
0.46
0.93
0.93
2.15
2.25
3.64
3.85
6.62
6.73
7.93
8.07
8.92
9.21
9.53
9.74
10.6
10.8
12.1
12.0
12.4
12.7
12.8
13.2
13.3
13.6
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
0
1
2
3
4
5
6
4.7%
5.8%
1.7%
1.8%
3.3%
2.2%
1.6%
-0.3%
2.6%
2.7%
2.3%
10
20
50
100
200
300
400
500
600
700
800
900
1000
Requested Throughput (Mb/s)

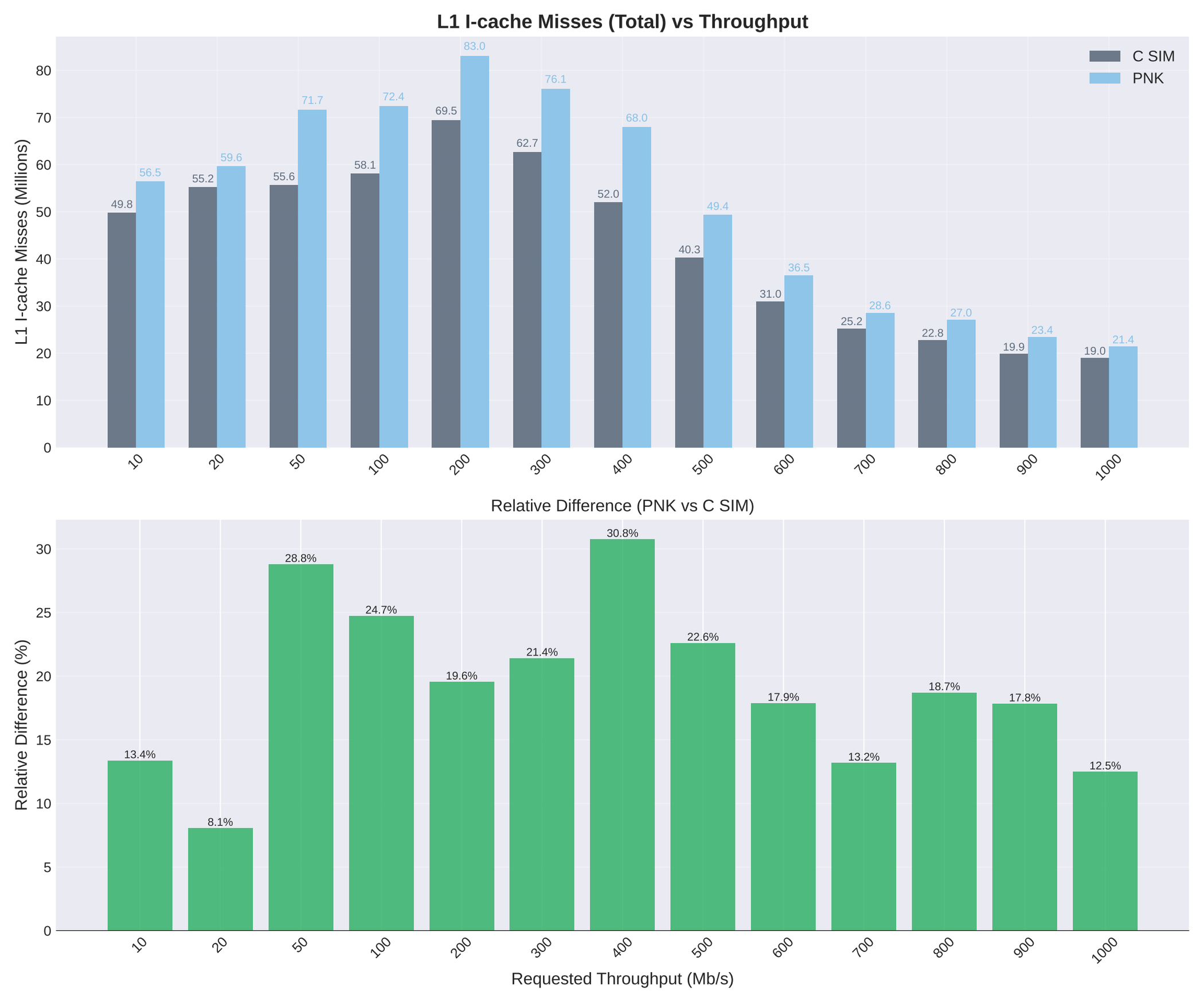

System CPU Utilization vs Throughput
C SIM
PNK
CPU Utilization (%)
0
10
20
30
40
50
60
2.95
2.91
5.90
5.53
12.7
13.6
21.2
22.0
35.7
36.3
41.9
42.6
45.3
46.7
47.7
48.2
51.1
51.2
54.6
54.5
57.8
58.2
61.2
61.5
63.4
63.7
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
8
6
4
2
0
−2
−4
−6
-1.4%
-6.3%
7.4%
3.5%
1.7%
1.8%
3.1%
1.0%
0.2%
-0.1%
0.7%
0.6%
0.5%
10
20
50
100
200
300
400
500
600
700
800
900
1000
Requested Throughput (Mb/s)

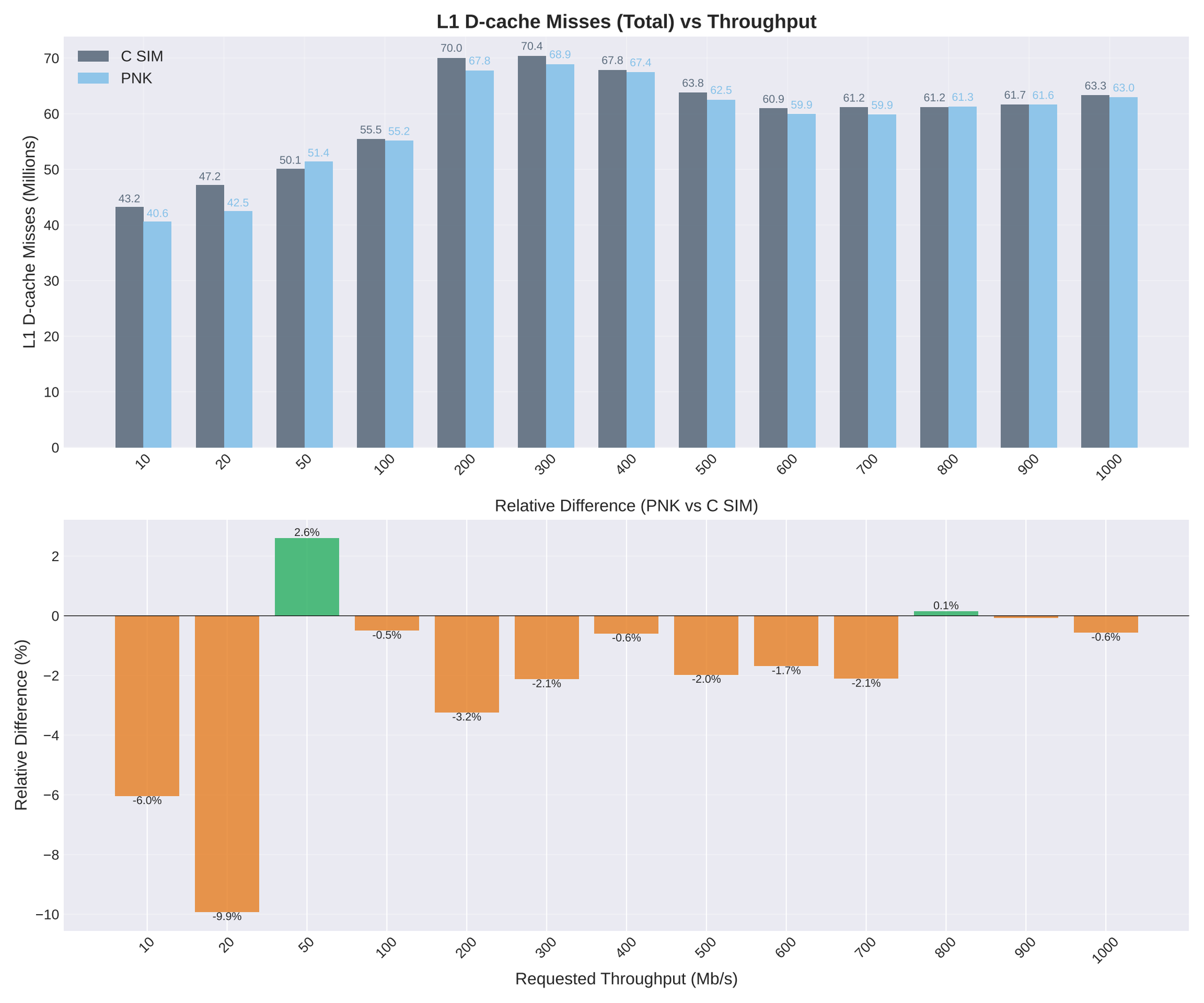

Total CPU Cycles vs Throughput
C SIM
PNK
Total Cycles (Billions)
0
50
100
150
200
250
256.0 256.0
138.0 138.0
67.5 67.5
43.9 43.9
32.2 32.2
28.3 28.3
26.3 26.3
25.1 25.1
24.3 24.3
23.8 23.8
23.4 23.4
23.1 23.1
23.0 22.9
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
0.0
−0.1
−0.2
−0.3
-0.4%
Requested Throughput (Mb/s)

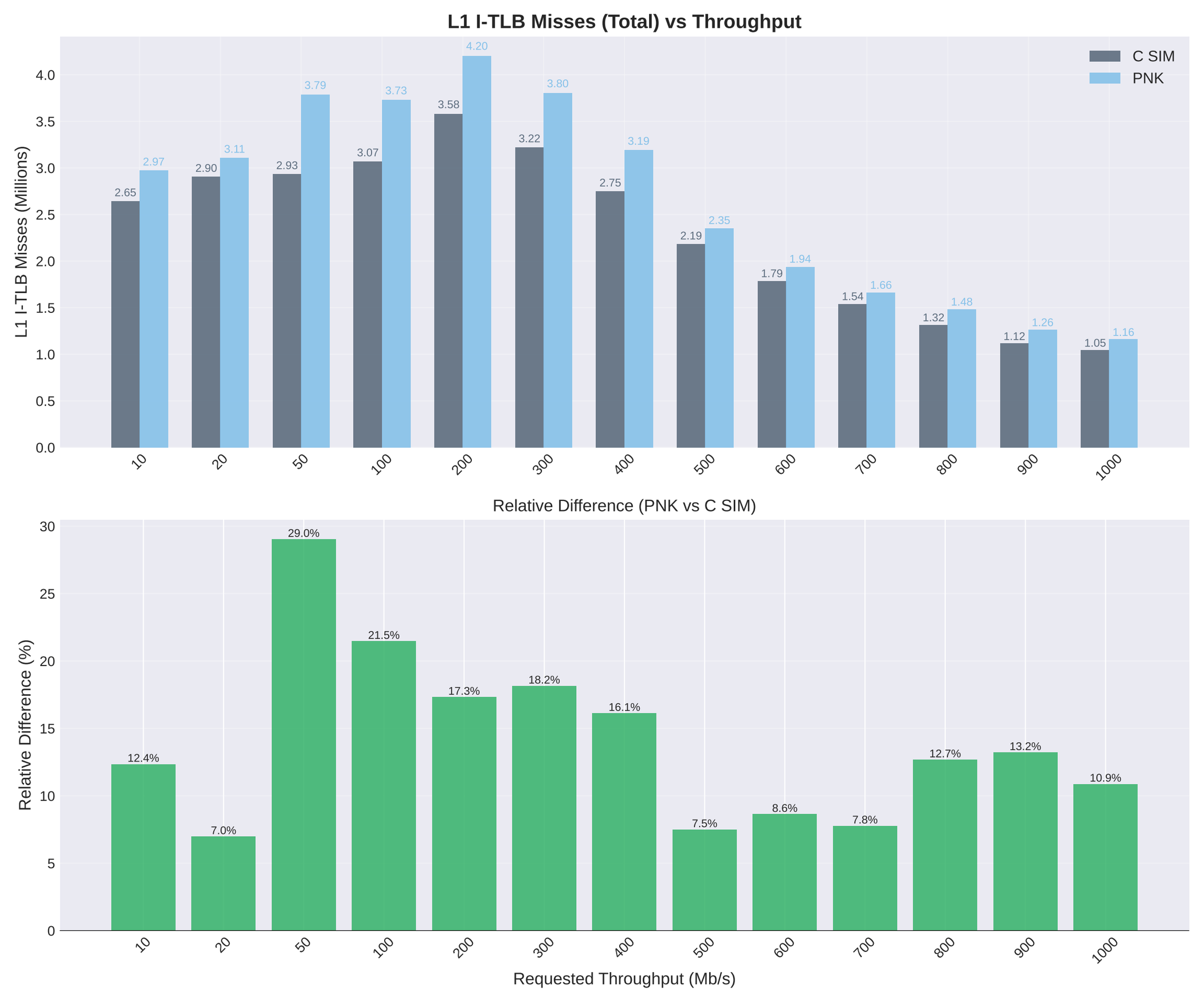
Kernel CPU Cycles vs Throughput
C SIM
PNK
Kernel Cycles (Billions)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2.33
2.30
2.57
2.39
2.67
2.89
2.76
2.94
3.32
3.43
3.11
3.19
2.76
2.96
2.30
2.34
1.95
1.96
1.71
1.69
1.48
1.50
1.20
1.21
1.10
1.09
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
8
6
4
2
0
−2
−4
−6
-1.2%
-7.0%
8.0%
6.4%
3.1%
2.8%
7.4%
1.9%
0.3%
-1.4%
1.5%
0.9%
-1.1%
10
20
50
100
200
300
400
500
600
700
800
900
1000
Requested Throughput (Mb/s)

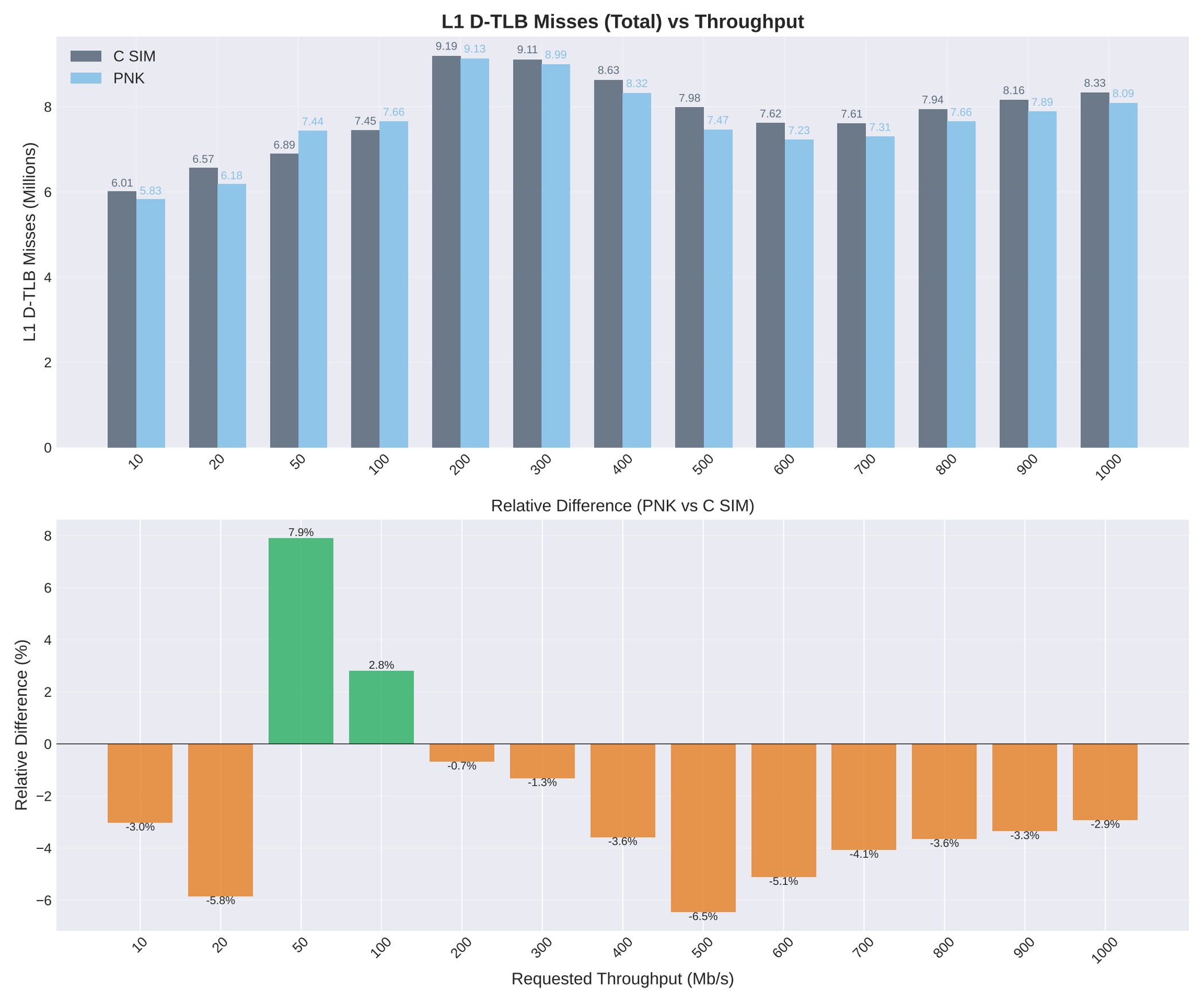

User CPU Cycles vs Throughput
C SIM
PNK
User Cycles (Billions)
0
2
4
6
8
10
12
14
4.55
4.46
4.95
4.67
5.37
5.67
6.03
6.19
7.72
7.81
8.40
8.49
8.94
9.15
9.57
9.65
10.4
10.4
11.2
11.2
11.9
12.0
12.8
12.9
13.3
13.4
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
6
4
2
0
−2
−4
−6
-1.8%
-5.8%
5.5%
2.6%
1.2%
1.1%
2.3%
0.8%
0.2%
0.6%
0.5%
0.2%
10
20
50
100
200
300
400
500
600
700
800
900
1000
Requested Throughput (Mb/s)

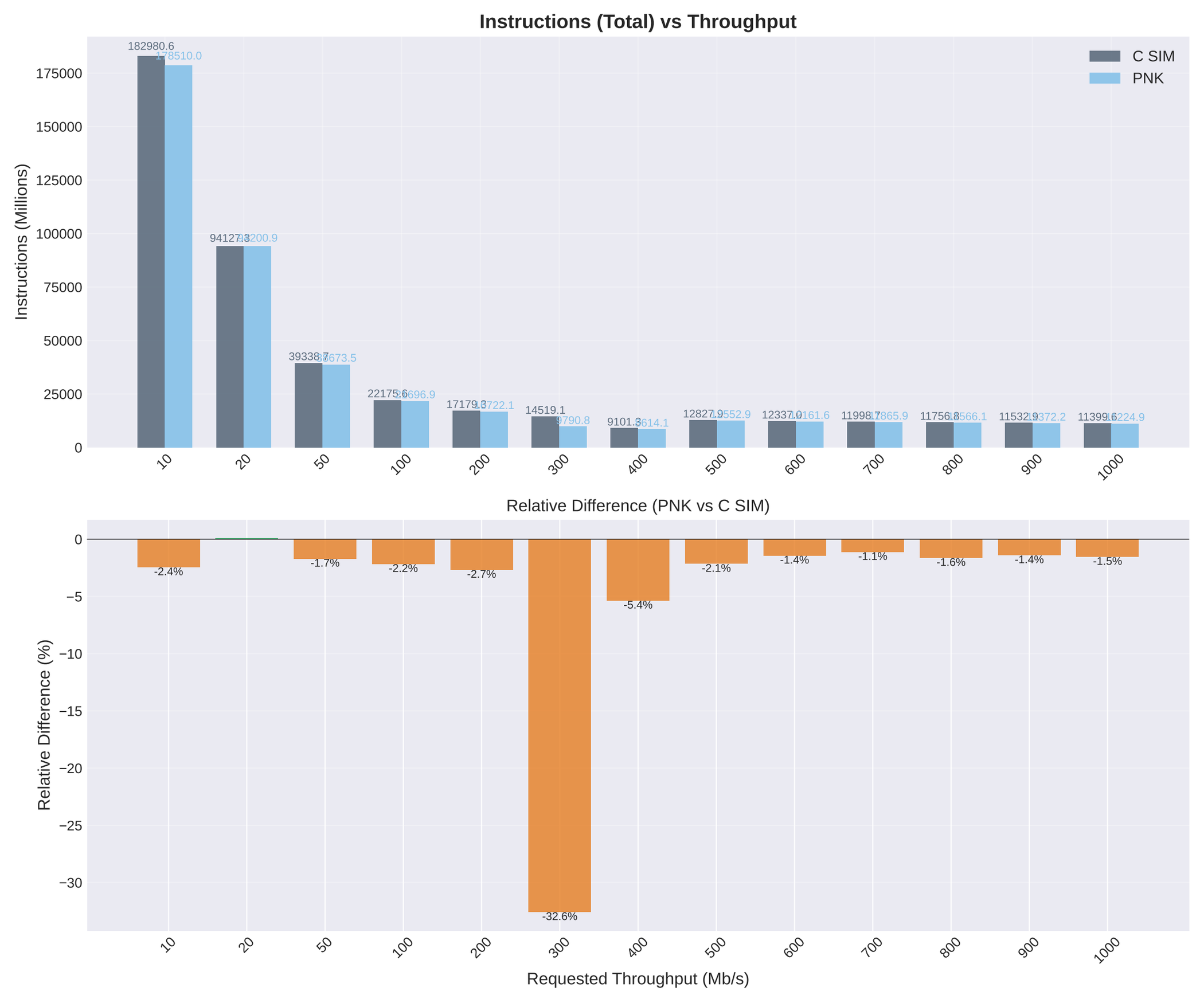

Idle CPU Cycles vs Throughput
C SIM
PNK
Idle Cycles (Billions)
248.4 248.5
129.9 130.4
59.0 58.4
34.6 34.3
20.7 20.5
16.4 16.2
14.4 14.0
13.1 13.0
11.9 11.9
10.8 10.8
9.87 9.77
8.95 8.87
8.40 8.30
Relative Difference (PNK vs C SIM)
Relative Difference (%)
0.4%
-1.0%
-0.9%
-0.9%
-1.2%
-2.5%
-0.9%
-0.1%
0.1%
-1.0%
-0.9%
-1.2%
Requested Throughput (Mb/s)

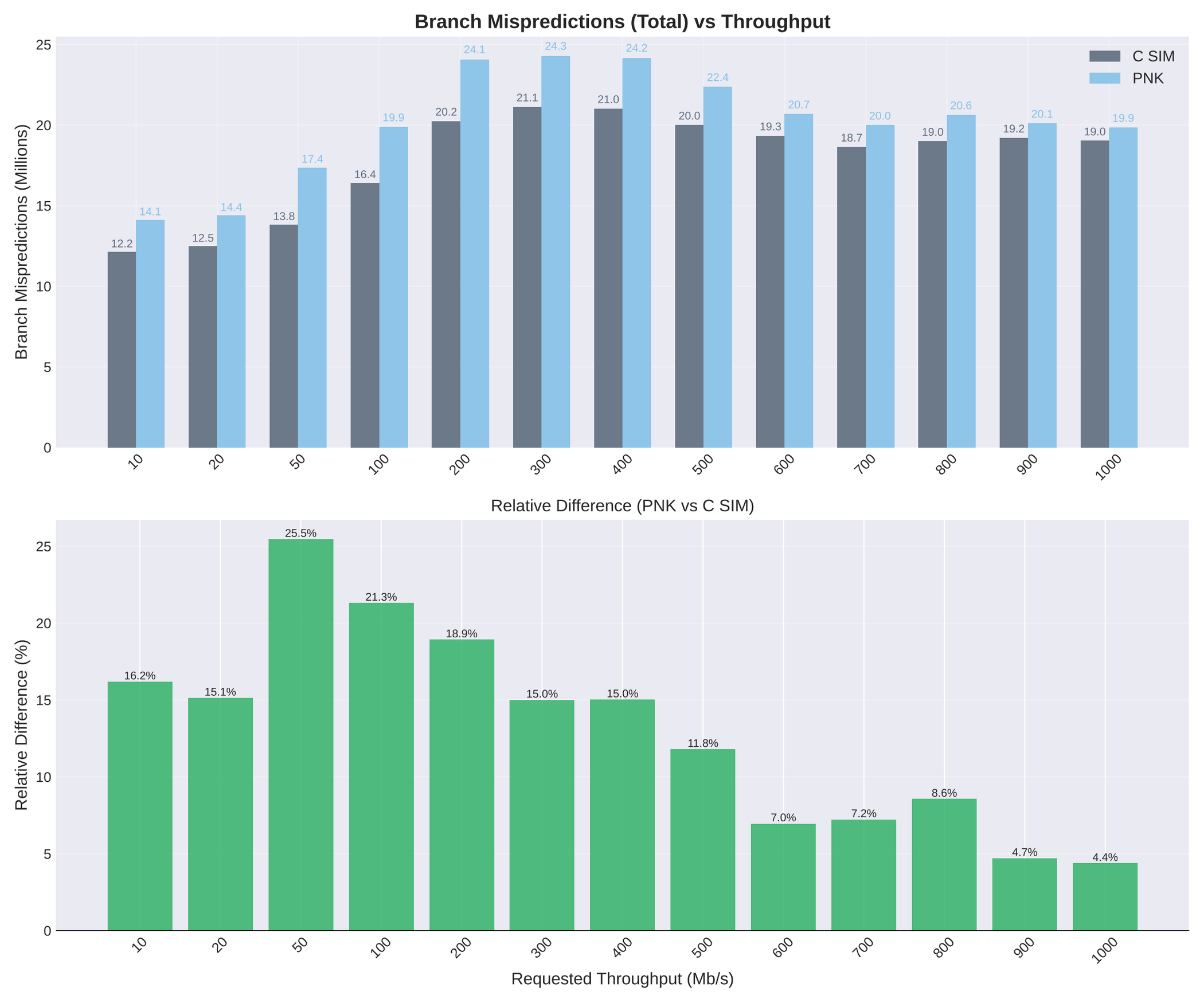

L1 I-cache Misses (Total) vs Throughput
L1 I-cache Misses (Millions)
C SIM
PNK
49.8
56.5
55.2
59.6
55.6
71.7
58.1
72.4
69.5
83.0
62.7
76.1
52.0
68.0
40.3
49.4
31.0
36.5
25.2
28.6
22.8
27.0
19.9
23.4
19.0
21.4
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
13.4%
8.1%
28.8%
24.7%
19.6%
21.4%
30.8%
22.6%
17.9%
13.2%
18.7%
17.8%
12.5%
Requested Throughput (Mb/s)

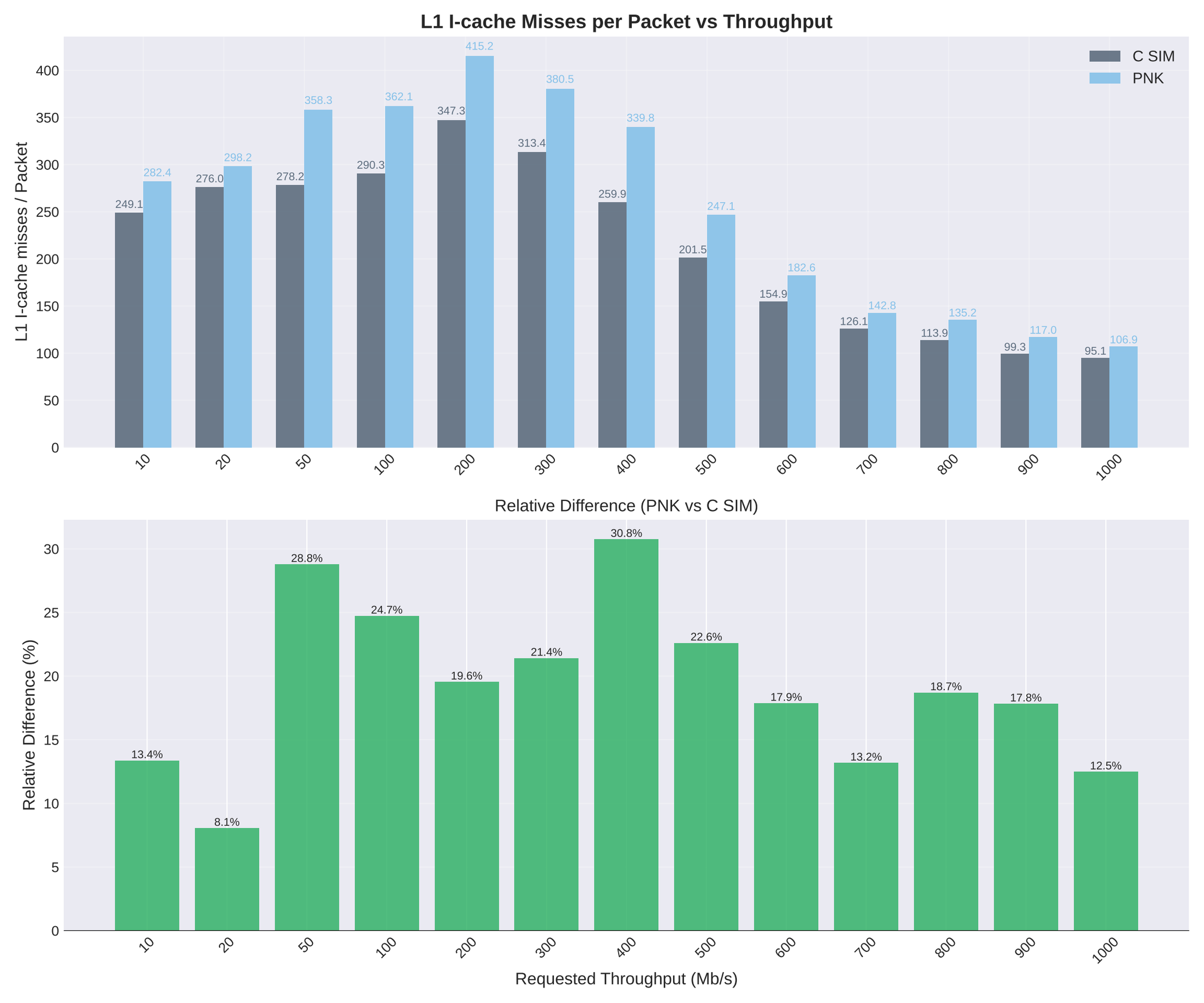

L1 D-cache Misses (Total) vs Throughput
C SIM
PNK
L1 D-cache Misses (Millions)
0
10
20
30
40
50
60
70
43.2
40.6
47.2
42.5
50.1
51.4
55.5
55.2
70.0
67.8
70.4
68.9
67.8
67.4
63.8
62.5
60.9
59.9
61.2
59.9
61.2
61.3
61.7
61.6
63.3
63.0
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
2
0
−2
−4
−6
−8
−10
-6.0%
-9.9%
2.6%
-0.5%
-3.2%
-2.1%
-0.6%
-2.0%
-1.7%
-2.1%
0.1%
-0.6%
Requested Throughput (Mb/s)

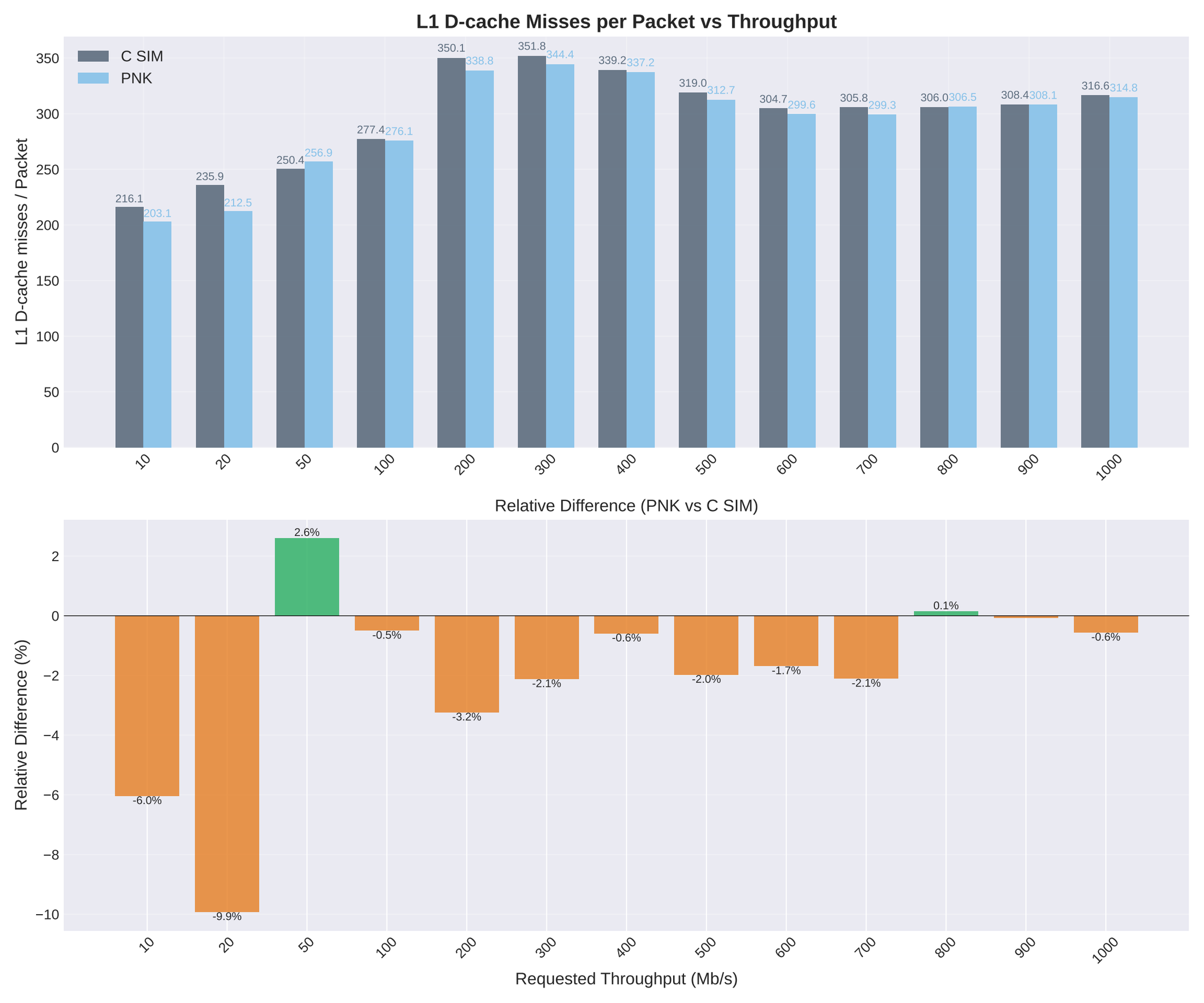

L1 I-TLB Misses (Total) vs Throughput
C SIM
PNK
L1 I-TLB Misses (Millions)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2.65
2.97
2.90
3.11
2.93
3.79
3.07
3.73
3.58
4.20
3.22
3.80
2.75
3.19
2.19
2.35
1.79
1.94
1.54
1.66
1.32
1.48
1.12
1.26
1.05
1.16
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
0
5
10
15
20
25
30
12.4%
7.0%
29.0%
21.5%
17.3%
18.2%
16.1%
7.5%
8.6%
7.8%
12.7%
13.2%
10.9%
Requested Throughput (Mb/s)

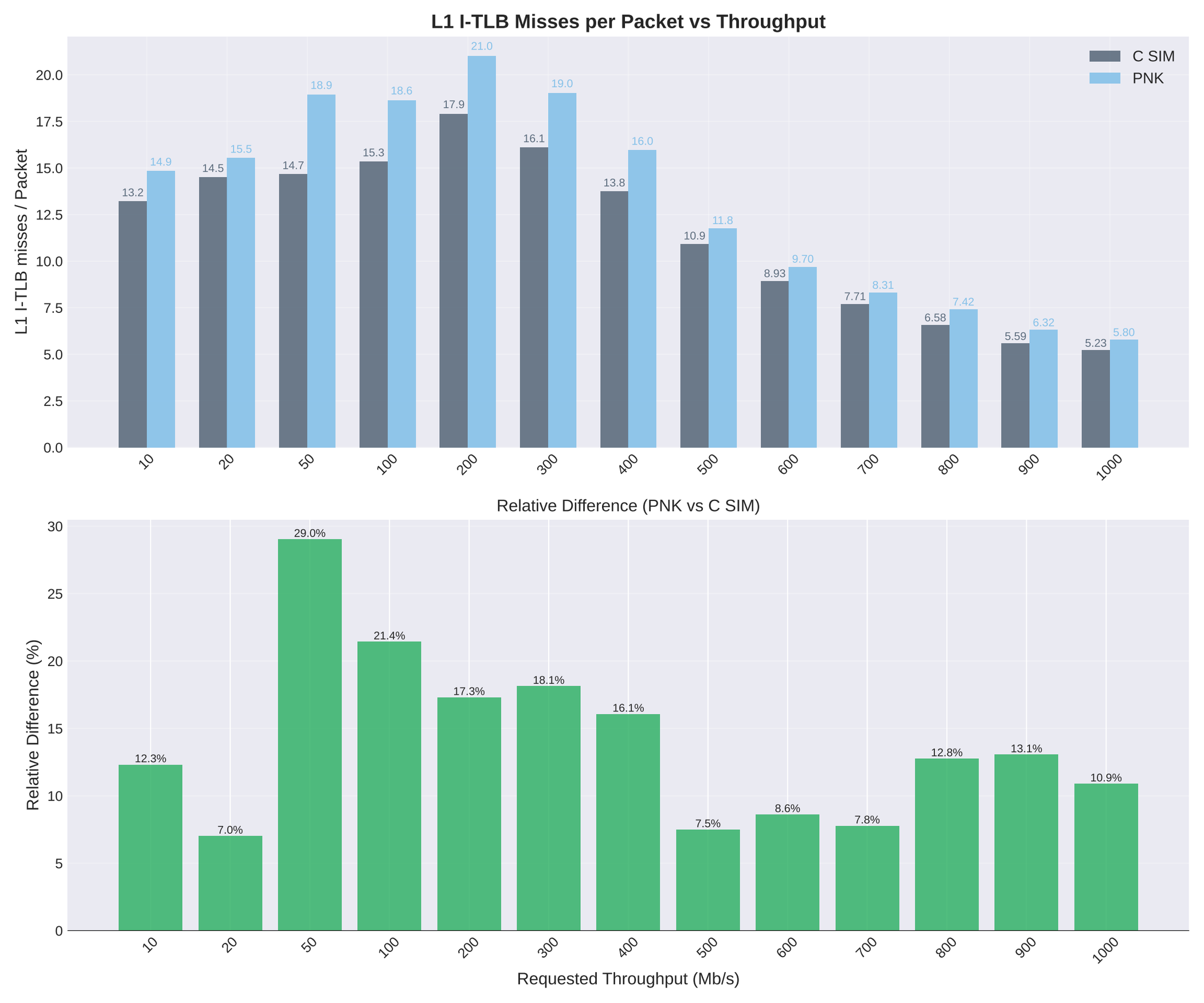

L1 D-TLB Misses (Total) vs Throughput
C SIM
PNK
L1 D-TLB Misses (Millions)
0
2
4
6
8
6.01
5.83
6.57
6.18
6.89
7.44
7.45
7.66
9.19
9.13
9.11
8.99
8.63
8.32
7.98
7.47
7.62
7.23
7.61
7.31
7.94
7.66
8.16
7.89
8.33
8.09
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
−6
−4
−2
0
2
4
6
8
-3.0%
-5.8%
7.9%
2.8%
-0.7%
-1.3%
-3.6%
-6.5%
-5.1%
-4.1%
-3.6%
-3.3%
-2.9%
Requested Throughput (Mb/s)

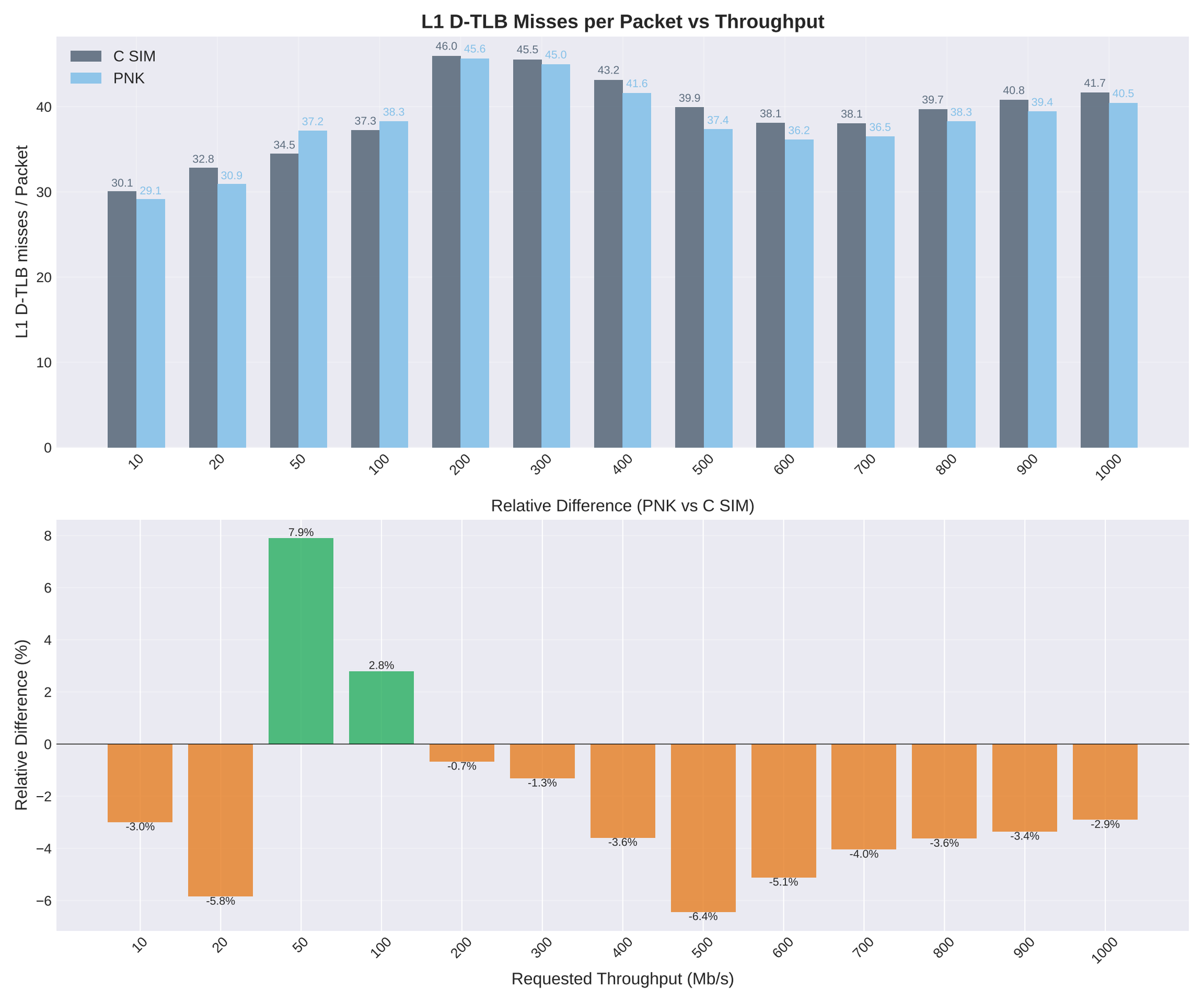

Instructions (Total) vs Throughput
C SIM
PNK
Instructions (Millions)
182980.6
178510.0
94127.3
93200.9
39338.7
38673.5
22175.6
21696.9
17179.3
16722.1
14519.1
9790.8
9101.3
8614.1
12827.9
8552.9
12337.0
8161.6
11998.1
7865.9
11756.8
7566.1
11532.9
7372.2
11399.6
7224.9
0
25000
50000
75000
100000
125000
150000
175000
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
0
−5
−10
−15
−20
−25
−30
-2.4%
-1.7%
-2.2%
-2.7%
-32.6%
-5.4%
-2.1%
-1.4%
-1.1%
-1.6%
-1.4%
-1.5%
Requested Throughput (Mb/s)

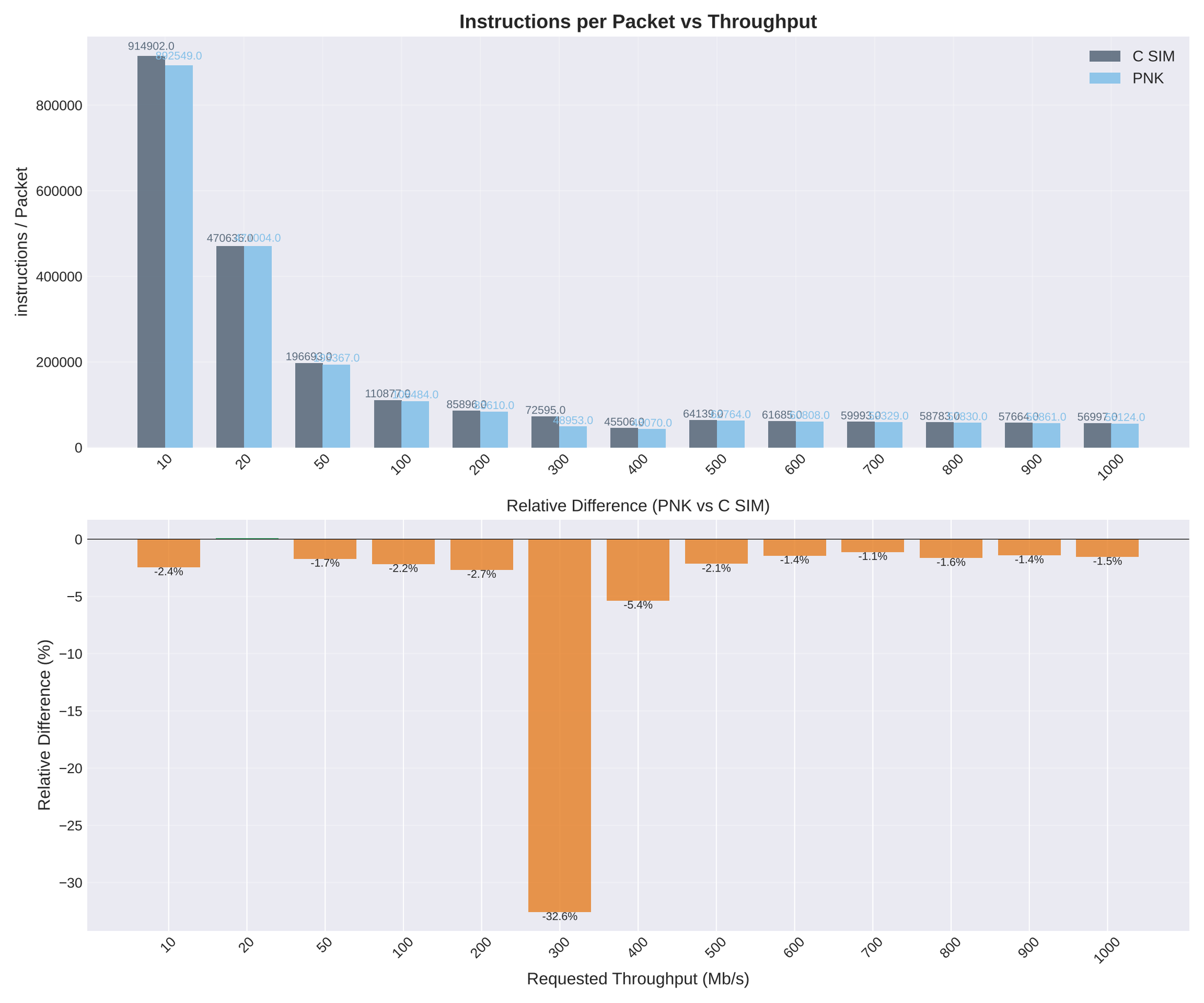

Branch Mispredictions (Total) vs Throughput
Branch Mispredictions (Millions)
C SIM
PNK
0
5
10
15
20
25
12.2
14.1
12.5
14.4
13.8
17.4
16.4
19.9
20.2
24.1
21.1
24.3
21.0
24.2
20.0
22.4
19.3
20.7
18.7
20.0
19.0
20.6
19.2
20.1
19.0
19.9
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
16.2%
15.1%
25.5%
21.3%
18.9%
15.0%
15.0%
11.8%
7.0%
7.2%
8.6%
4.7%
4.4%
Requested Throughput (Mb/s)


L1 I-cache Misses per Packet vs Throughput
L1 I-cache misses / Packet
C SIM
PNK
249.1
282.4
276.0
298.2
278.2
358.3
290.3
362.1
347.3
415.2
313.4
380.5
259.9
339.8
201.5
247.1
154.9
182.6
126.1
142.8
113.9
135.2
99.3
117.0
95.1
106.9
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
13.4%
8.1%
28.8%
24.7%
19.6%
21.4%
30.8%
22.6%
17.9%
13.2%
18.7%
17.8%
12.5%
Requested Throughput (Mb/s)

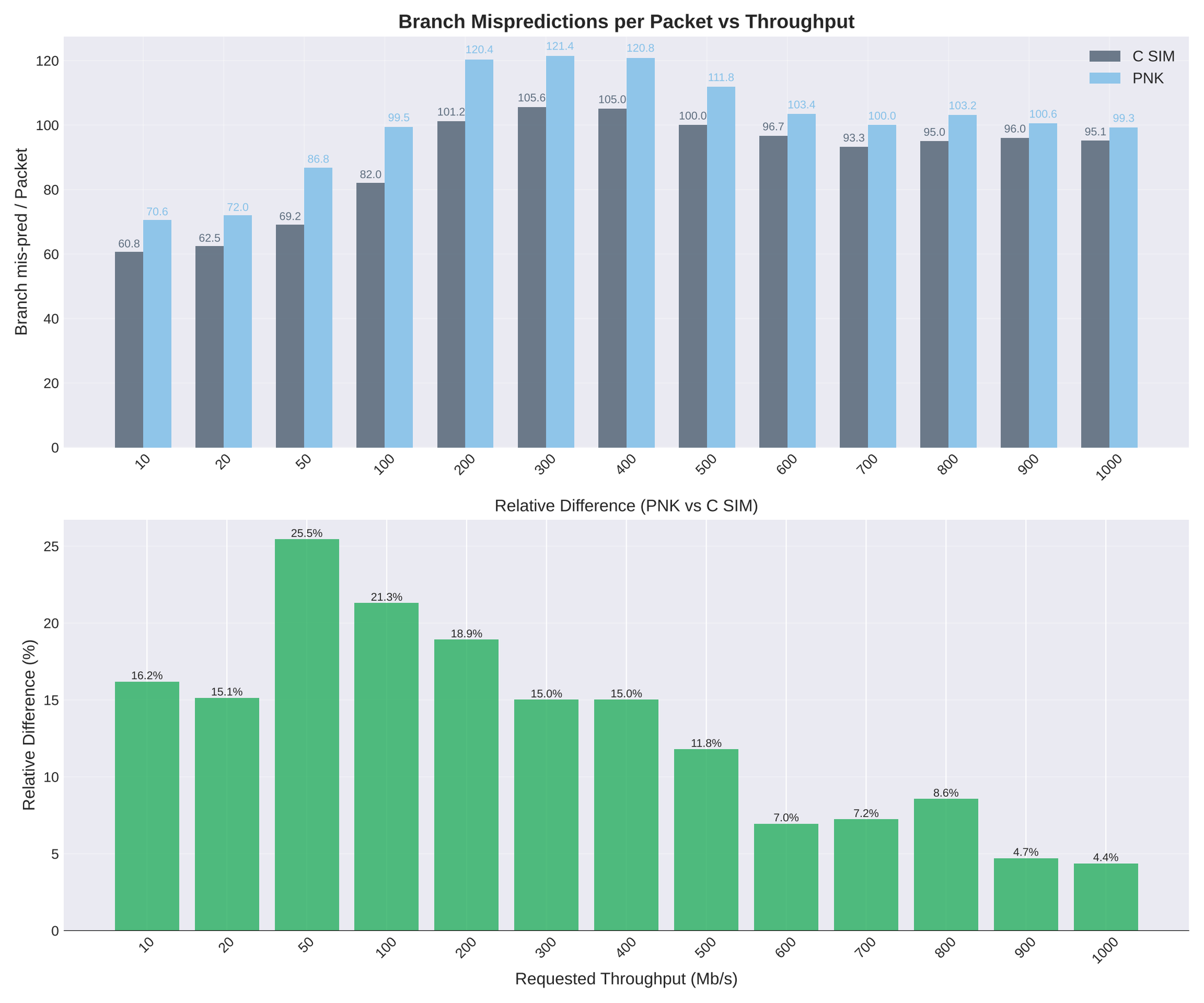

L1 D-cache Misses per Packet vs Throughput
C SIM
PNK
L1 D-cache misses / Packet
0
50
100
150
200
250
300
350
216.1
203.1
235.9
212.5
250.4
256.9
277.4
276.1
350.1
338.8
351.8
344.4
339.2
337.2
319.0
312.7
304.7
299.6
305.8
299.3
306.0
306.5
308.4
308.1
316.6
314.8
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
2
0
−2
−4
−6
−8
−10
-6.0%
-9.9%
2.6%
-0.5%
-3.2%
-2.1%
-0.6%
-2.0%
-1.7%
-2.1%
0.1%
-0.6%
Requested Throughput (Mb/s)

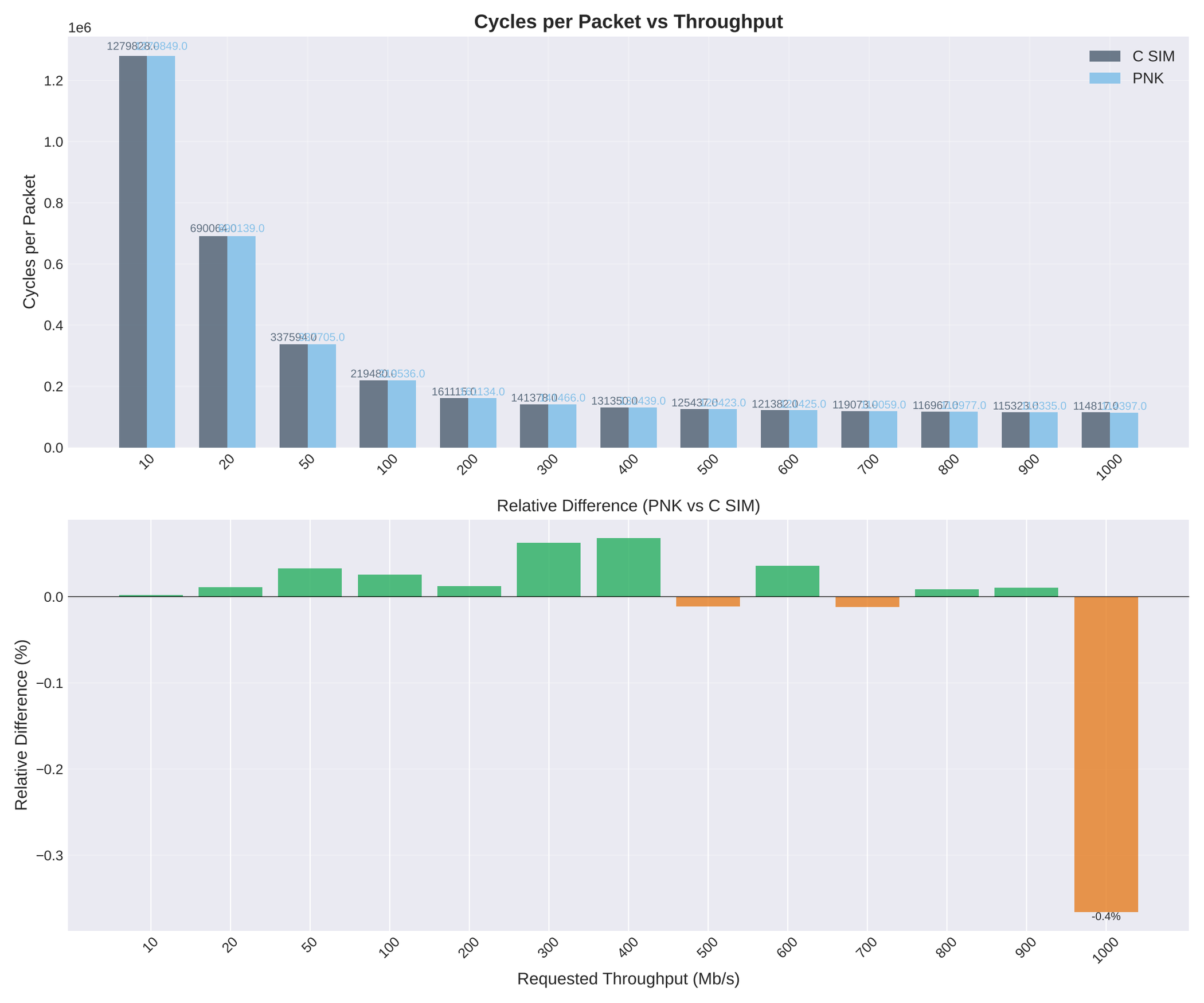

L1 I-TLB Misses per Packet vs Throughput
L1 I-TLB misses / Packet
C SIM
PNK
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
13.2
14.9
14.5
15.5
14.7
18.9
15.3
18.6
17.9
21.0
16.1
19.0
13.8
16.0
10.9
11.8
8.93
9.70
7.71
8.31
6.58
7.42
5.59
6.32
5.23
5.80
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
0
5
10
15
20
25
30
12.3%
7.0%
29.0%
21.4%
17.3%
18.1%
16.1%
7.5%
8.6%
7.8%
12.8%
13.1%
10.9%
Requested Throughput (Mb/s)

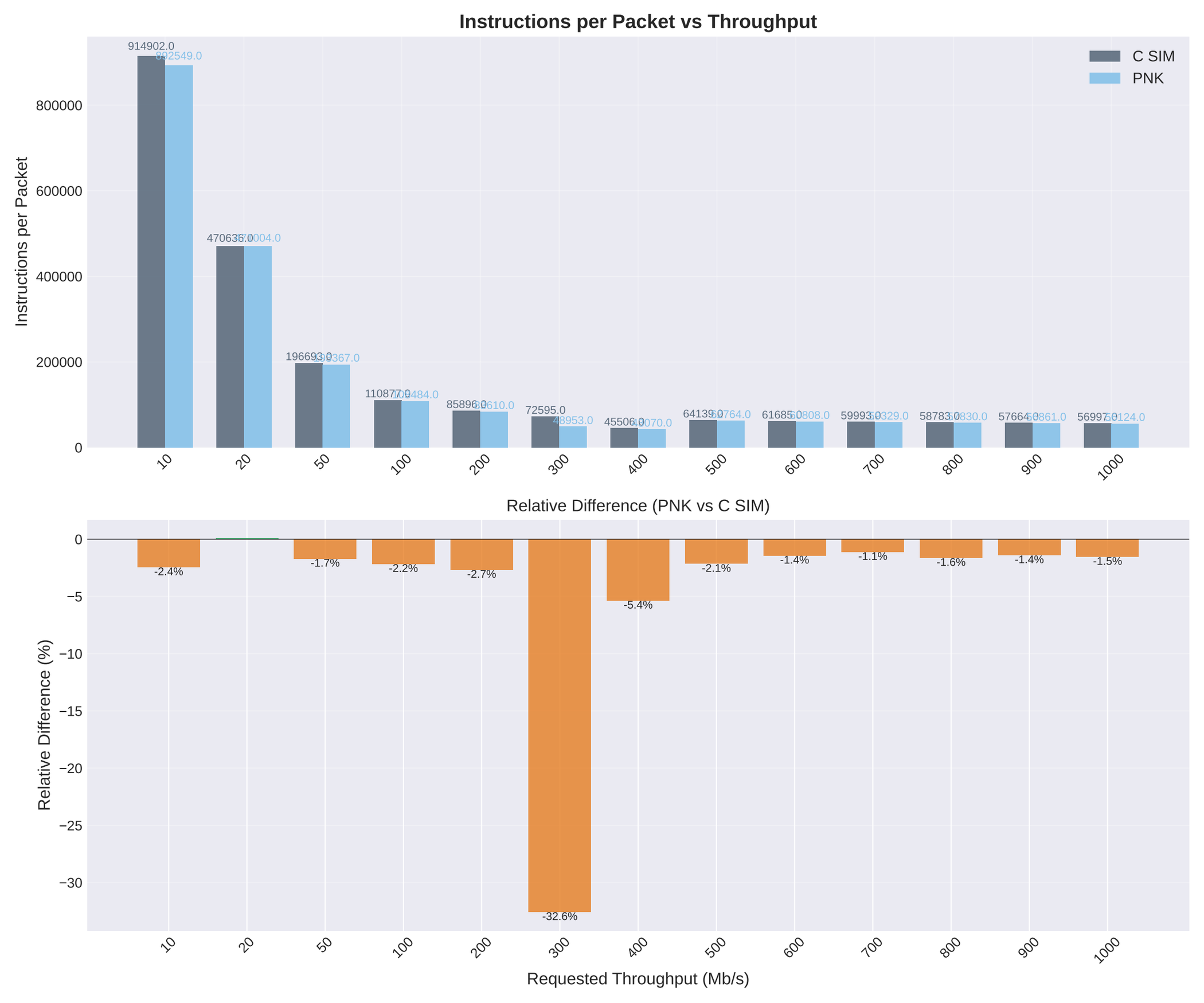

L1 D-TLB Misses per Packet vs Throughput
C SIM
PNK
L1 D-TLB misses / Packet
0
10
20
30
40
30.1
29.1
32.8
30.9
34.5
37.2
37.3
38.3
46.0
45.6
45.5
45.0
43.2
41.6
39.9
37.4
38.1
36.2
38.1
36.5
39.7
38.3
40.8
39.4
41.7
40.5
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
8
6
4
2
0
−2
−4
−6
7.9%
2.8%
-3.0%
-5.8%
-0.7%
-1.3%
-3.6%
-6.4%
-5.1%
-4.0%
-3.6%
-3.4%
-2.9%
Requested Throughput (Mb/s)

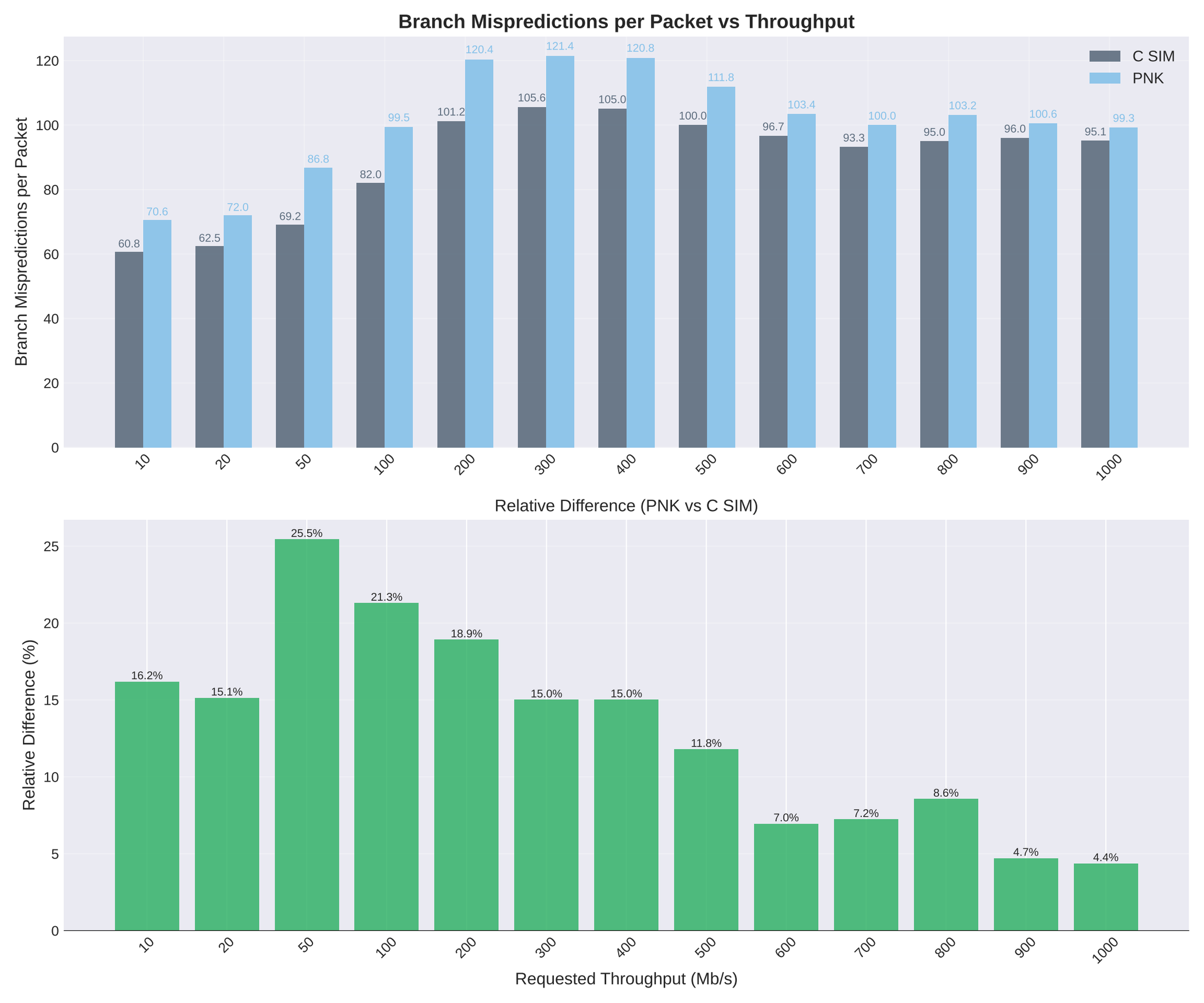


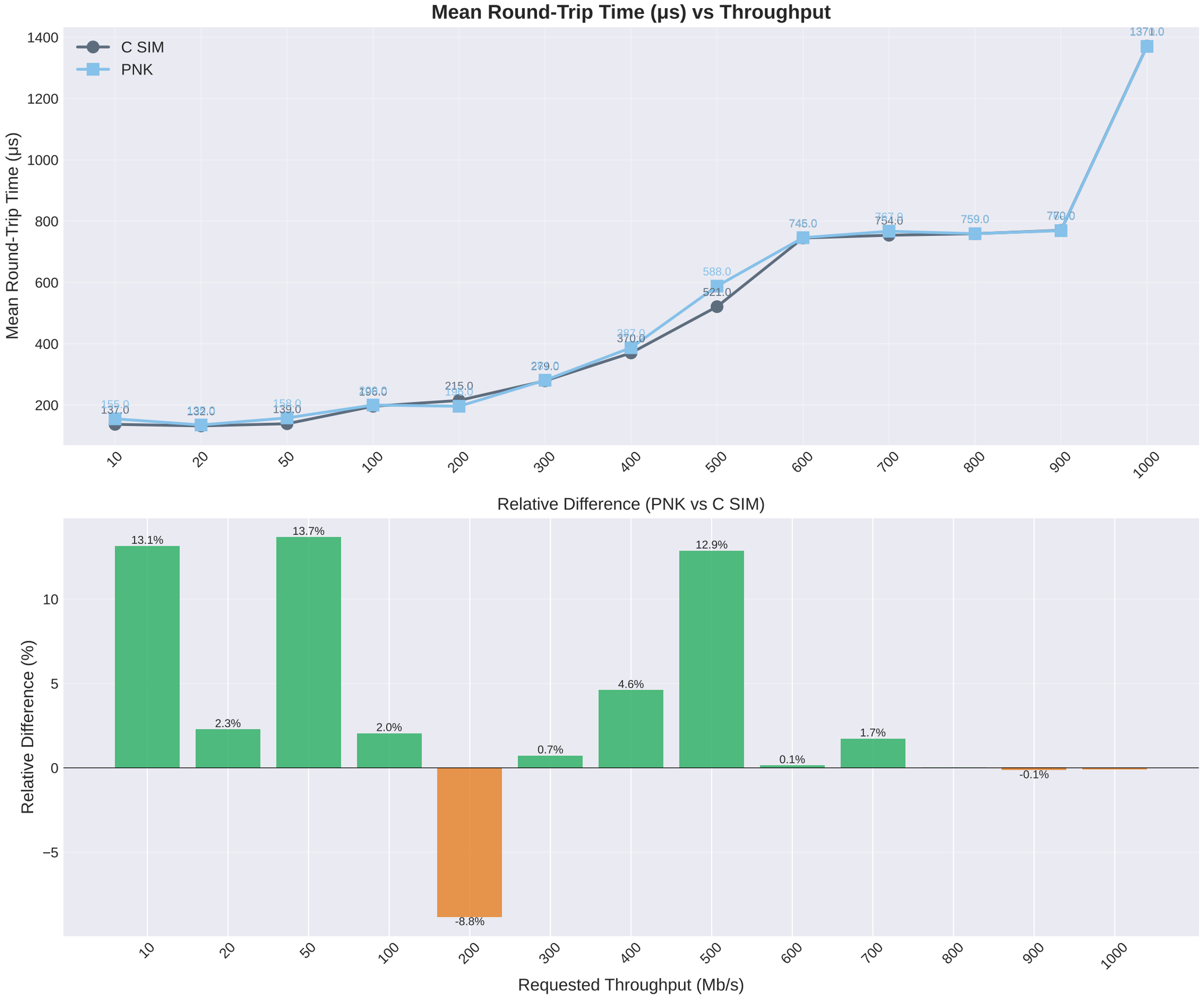
Instructions per Packet vs Throughput
C SIM
PNK
instructions / Packet
0
200000
400000
600000
800000
914902.0
802549.0
470636.0
470004.0
196693.0
199367.0
110877.0
109484.0
85896.0
89610.0
72595.0
48953.0
45506.0
40070.0
64139.0
60764.0
61685.0
60808.0
59993.0
60329.0
58783.0
60830.0
57664.0
60861.0
56997.0
60124.0
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
0
−5
−10
−15
−20
−25
−30
-2.4%
-1.7%
-2.2%
-2.7%
-32.6%
-5.4%
-2.1%
-1.4%
-1.1%
-1.6%
-1.4%
-1.5%
Requested Throughput (Mb/s)

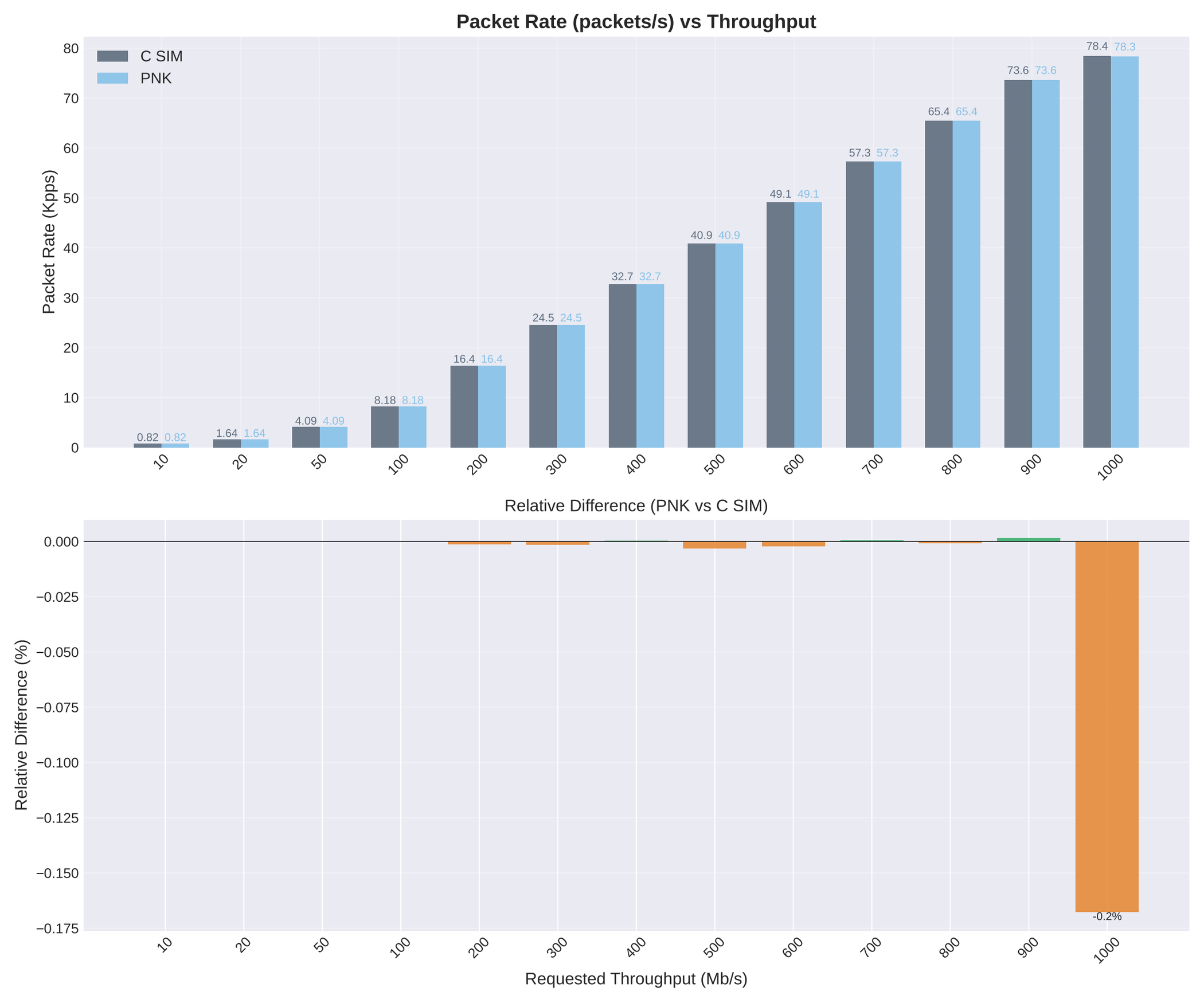

Branch Mispredictions per Packet vs Throughput
Branch mis-pred / Packet
C SIM
PNK
60.8
70.6
62.5
72.0
69.2
86.8
82.0
99.5
101.2
120.4
105.6
121.4
105.0
120.8
100.0
111.8
96.7
103.4
93.3
100.0
95.0
103.2
96.0
100.6
95.1
99.3
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
16.2%
15.1%
25.5%
21.3%
18.9%
15.0%
15.0%
11.8%
7.0%
7.2%
8.6%
4.7%
4.4%
Requested Throughput (Mb/s)

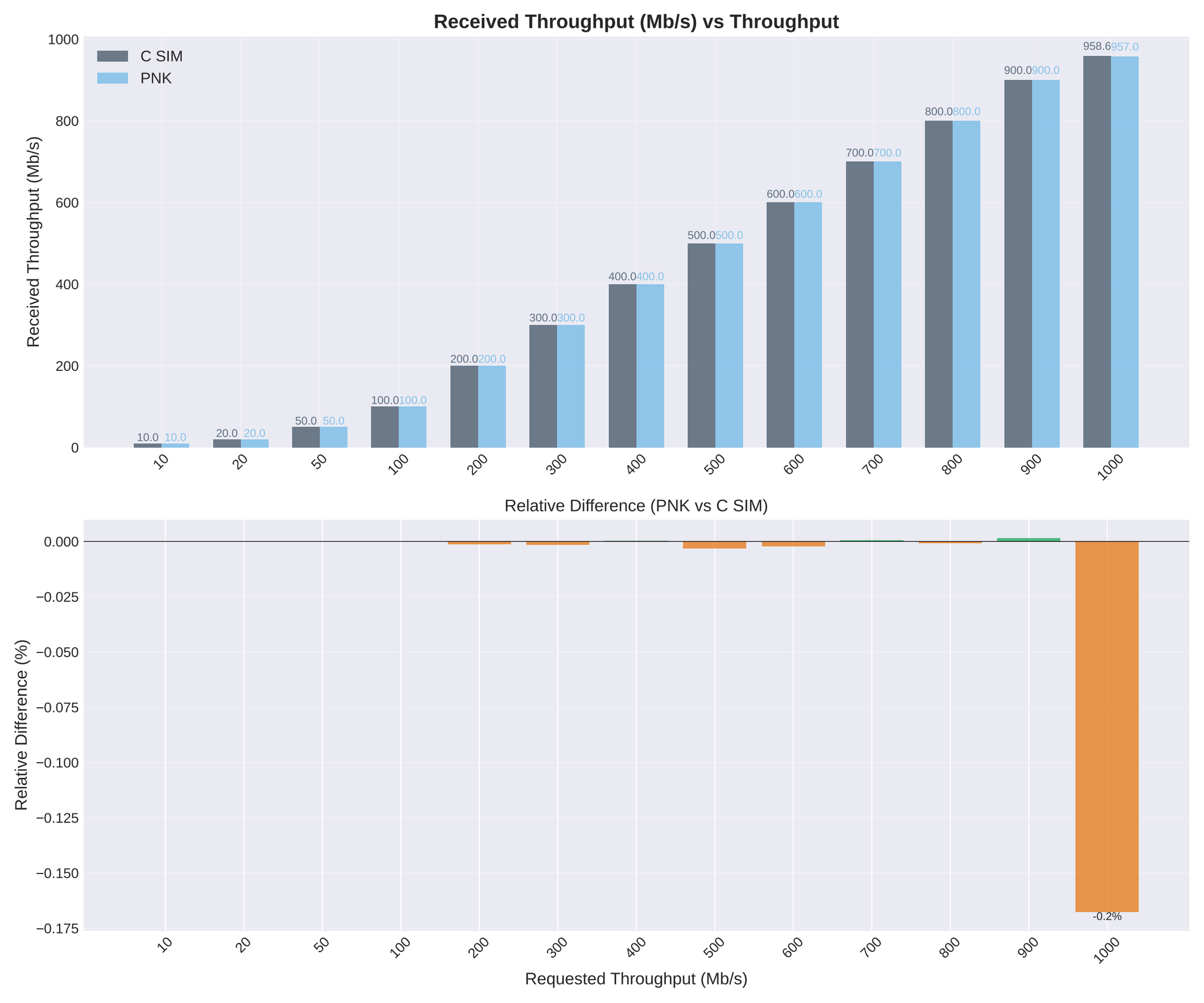

Cycles per Packet vs Throughput
1e6
Cycles per Packet
C SIM
PNK
1279828.0
1280849.0
690064.0
690139.0
337594.0
337705.0
219480.0
219536.0
161111.0
161134.0
141378.0
141466.0
131350.0
131439.0
125437.0
125423.0
121382.0
121425.0
119073.0
119059.0
116967.0
116977.0
115323.0
115335.0
114817.0
114397.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
0.0
−0.1
−0.2
−0.3
-0.4%
Requested Throughput (Mb/s)


Instructions per Packet vs Throughput
C SIM
PNK
Instructions per Packet
0
200000
400000
600000
800000
914902.0
802549.0
470636.0
470004.0
196693.0
196367.0
110877.0
110484.0
85896.0
85610.0
72595.0
48953.0
45506.0
45070.0
64139.0
63764.0
61685.0
61308.0
59993.0
59329.0
58783.0
58330.0
57664.0
57261.0
56997.0
56124.0
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
0
−5
−10
−15
−20
−25
−30
-2.4%
-1.7%
-2.2%
-2.7%
-32.6%
-5.4%
-2.1%
-1.4%
-1.1%
-1.6%
-1.4%
-1.5%
Requested Throughput (Mb/s)


Branch Mispredictions per Packet vs Throughput
Branch Mispredictions per Packet
C SIM
PNK
60.8
70.6
62.5
72.0
69.2
86.8
82.0
99.5
101.2
120.4
105.6
121.4
105.0
120.8
100.0
111.8
96.7
103.4
93.3
100.0
95.0
103.2
96.0
100.6
95.1
99.3
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
16.2%
15.1%
25.5%
21.3%
18.9%
15.0%
15.0%
11.8%
7.0%
7.2%
8.6%
4.7%
4.4%
Requested Throughput (Mb/s)


Mean Round-Trip Time (µs) vs Throughput
C SIM
PNK
Mean Round-Trip Time (µs)
1400
1200
1000
800
600
400
200
155.0
137.0
132.0
158.0
139.0
196.0
215.0
279.0
387.0
370.0
588.0
521.0
745.0
754.0
759.0
1371.0
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
13.1%
2.3%
13.7%
2.0%
-8.8%
0.7%
4.6%
12.9%
0.1%
1.7%
-0.1%
10
5
0
−5
Requested Throughput (Mb/s)


Packet Rate (packets/s) vs Throughput
C SIM
PNK
Packet Rate (Kpps)
0
10
20
30
40
50
60
70
80
0.82 0.82
1.64 1.64
4.09 4.09
8.18 8.18
16.4 16.4
24.5 24.5
32.7 32.7
40.9 40.9
49.1 49.1
57.3 57.3
65.4 65.4
73.6 73.6
78.4 78.3
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
0.000
−0.025
−0.050
−0.075
−0.100
−0.125
−0.150
−0.175
-0.2%
Requested Throughput (Mb/s)


Received Throughput (Mb/s) vs Throughput
C SIM
PNK
Received Throughput (Mb/s)
1000
800
600
400
200
0
10.0 10.0
20.0 20.0
50.0 50.0
100.0 100.0
200.0 200.0
300.0 300.0
400.0 400.0
500.0 500.0
600.0 600.0
700.0 700.0
800.0 800.0
900.0 900.0
958.6 957.0
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
0.000
−0.025
−0.050
−0.075
−0.100
−0.125
−0.150
−0.175
-0.2%
Requested Throughput (Mb/s)

Sent Throughput (Mb/s) vs Throughput
C SIM
PNK
Sent Throughput (Mb/s)
0
200
400
600
800
1000
10.0 10.0
20.0 20.0
50.0 50.0
100.0 100.0
200.0 200.0
300.0 300.0
400.0 400.0
500.0 500.0
600.0 600.0
700.0 700.0
800.0 800.0
900.0 900.0
1000.0 1000.0
10
20
50
100
200
300
400
500
600
700
800
900
1000
Relative Difference (PNK vs C SIM)
Relative Difference (%)
0.0006
0.0004
0.0002
0.0000
−0.0002
−0.0004
Requested Throughput (Mb/s)