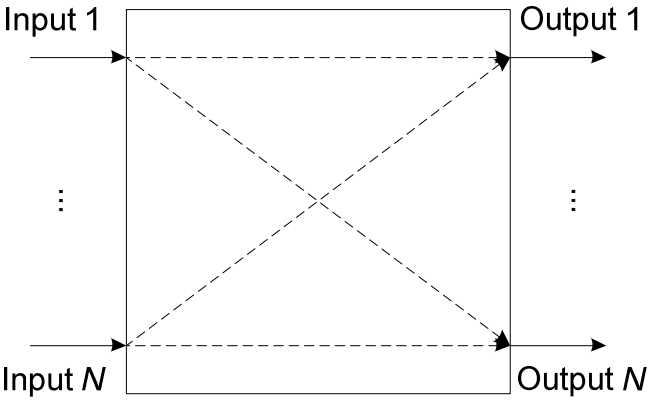
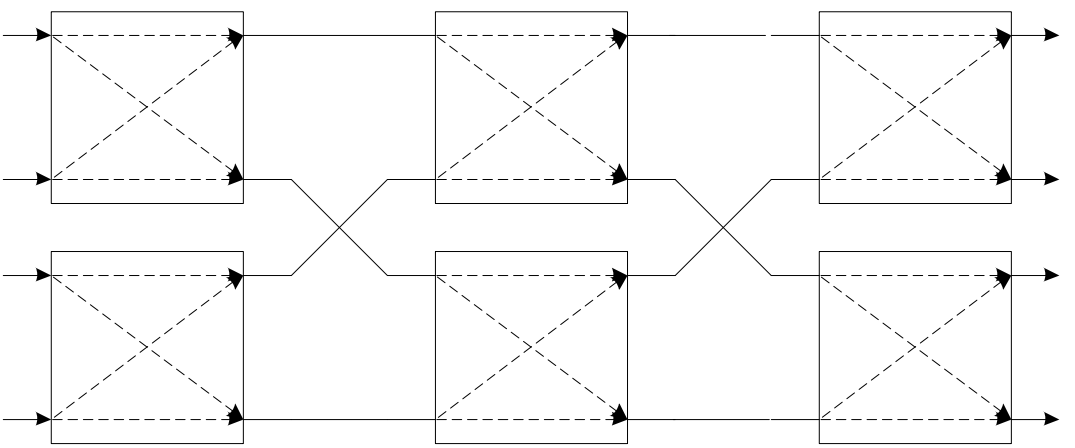
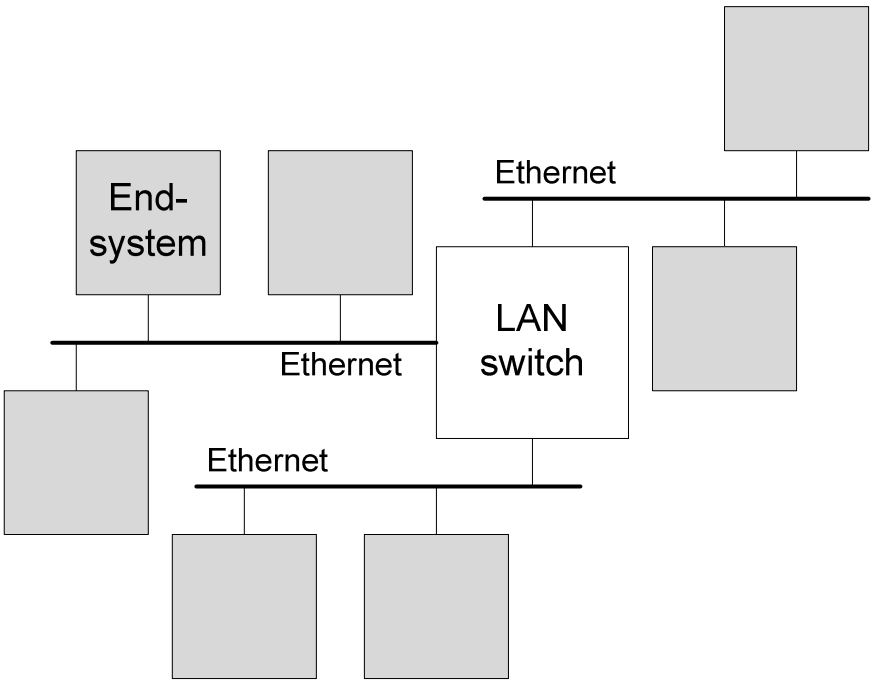
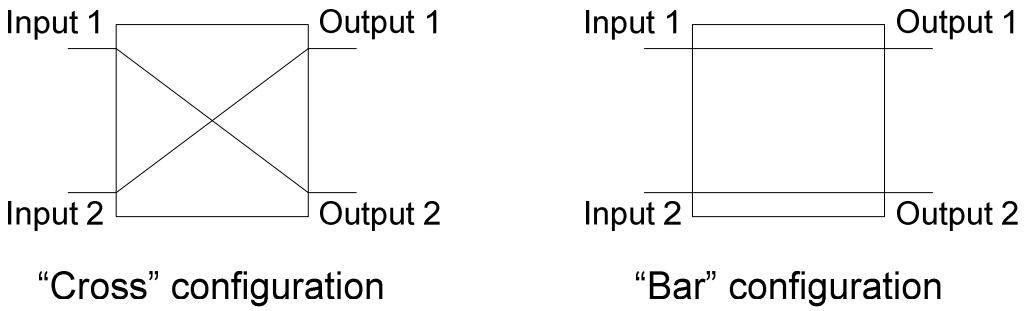


(a)



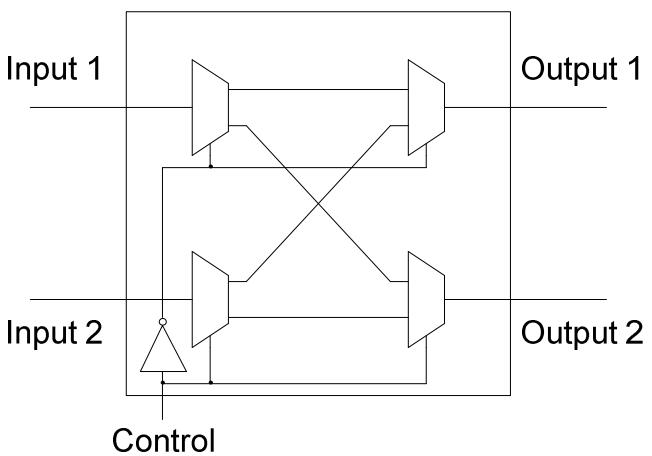
(b)


End-
system
Ethernet
LAN
switch
Ethernet
Ethernet

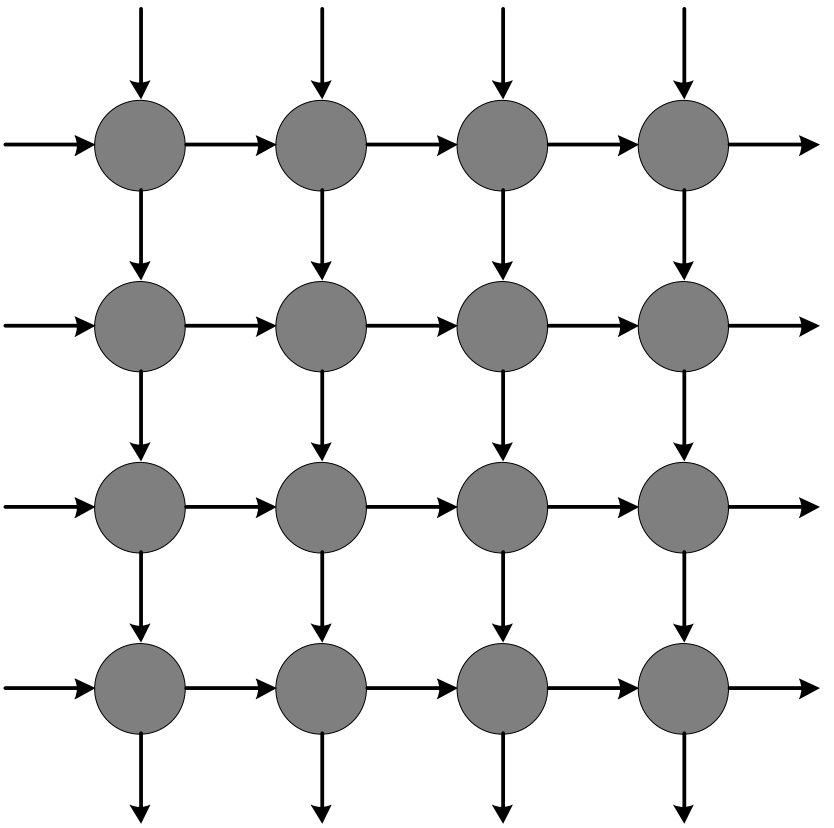


"Cross" configuration "Bar" configuration

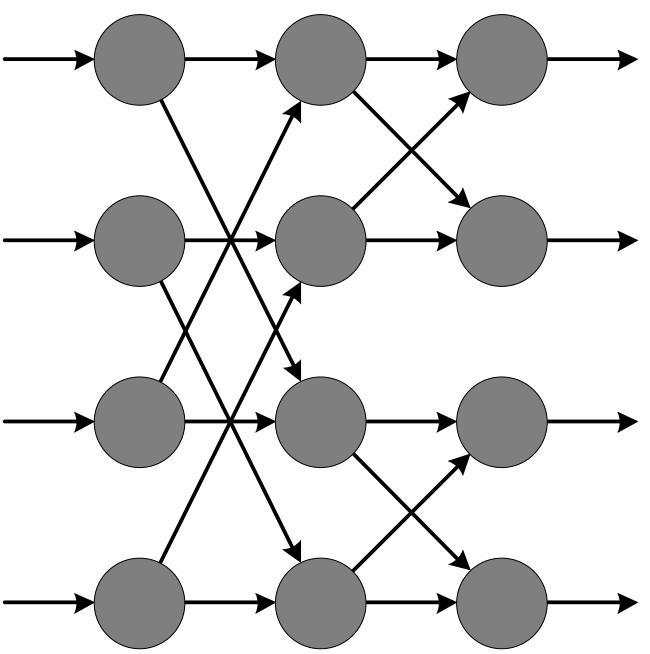
(a)



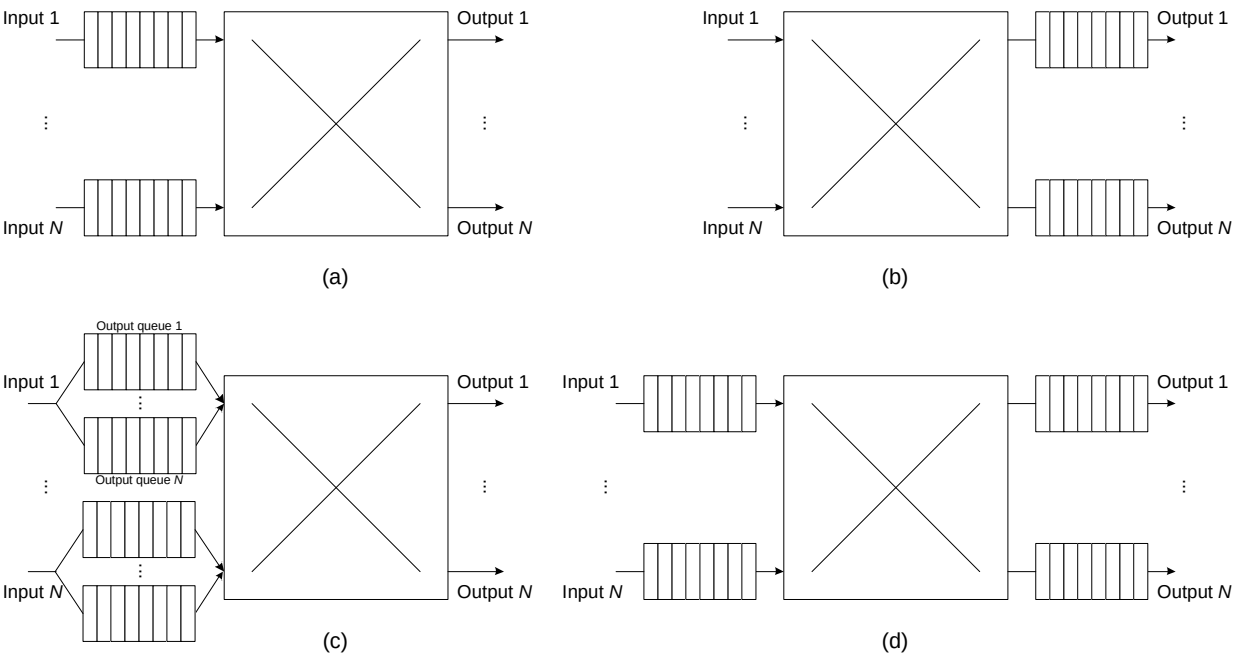
(b)

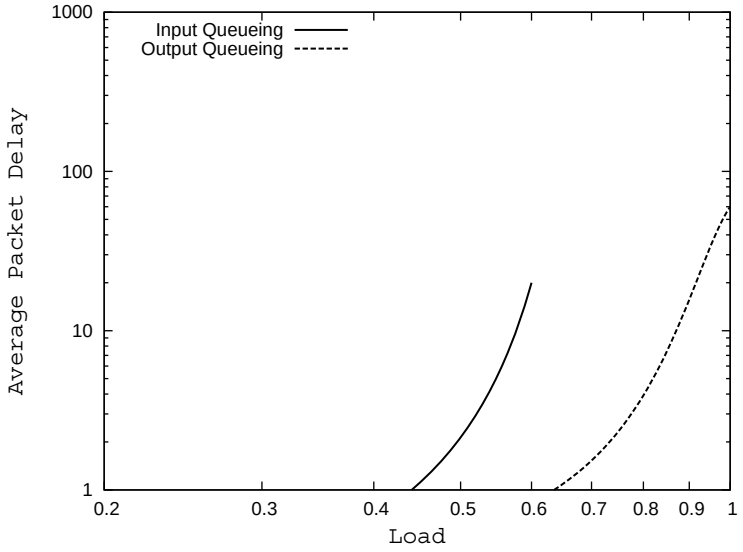


(a)



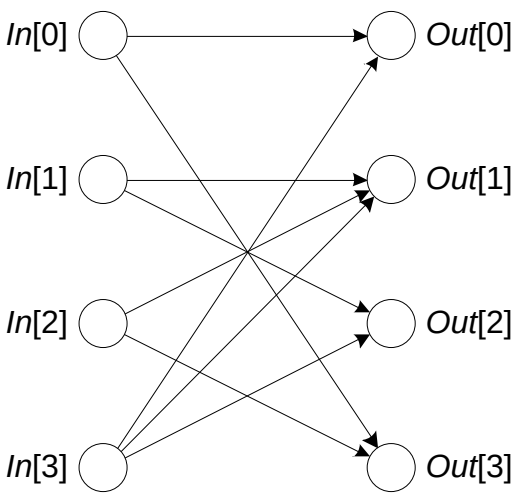
(b)


Input 1
Input N
Output 1
Output N
(a)
Input 1
Input N
Output 1
Output N
(b)
Output queue 1
Output queue N
Input 1
Input N
Output 1
Output N
(c)
Input 1
Input N
Output 1
Output N
(d)


Input Queueing
Output Queueing
Average Packet Delay
Load
1000
100
10
1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

Inputs \ Outputs	0	1	2	3
0	1	0	0	1
1	0	1	1	0
2	0	1	0	1
3	1	1	1	0

(a)



(b)

	Out[0]	*Out*[1]	*Out*[2]	*Out*[3]
In[0]	D_0	D_1	D_2	D_3
In[1]	D_3	D_0	D_1	D_2
In[2]	D_2	D_3	D_0	D_1
In[3]	D_1	D_2	D_3	D_0

(a)

Switch cycle →

Diagonal sequence ↓

	0	1	2	3
0	0	1	2	3
1	1	3	0	2
2	2	0	3	1
3	3	2	1	0

(b)

Time slot index →

Pattern sequence ↓

Outputs

Inputs

	0	1	2	3
0	0	1	2	3
1	3	0	1	2
2	2	3	0	1
3	1	2	3	0

Time slot 0

	0	1	2	3
0	0	1	2	3
1	1	3	0	2
2	2	0	3	1
3	3	2	1	0

Time slot 1

Pattern 0

	0	1	2	3
0	1	0	0	1
1	0	1	1	0
2	0	1	0	1
3	1	1	1	0

Pattern 1

	0	1	2	3
0	1	0	0	1
1	0	1	1	0
2	0	1	0	1
3	1	1	1	0

Pattern 1

	0	1	2	3
0	1	0	0	1
1	0	1	1	0
2	0	1	0	1
3	1	1	1	0

Pattern 3

	0	1	2	3
0	1	0	0	1
1	0	1	1	0
2	0	1	0	1
3	1	1	1	0

Pattern 2

	0	1	2	3
0	1	0	0	1
1	0	1	1	0
2	0	1	0	1
3	1	1	1	0

Pattern 0

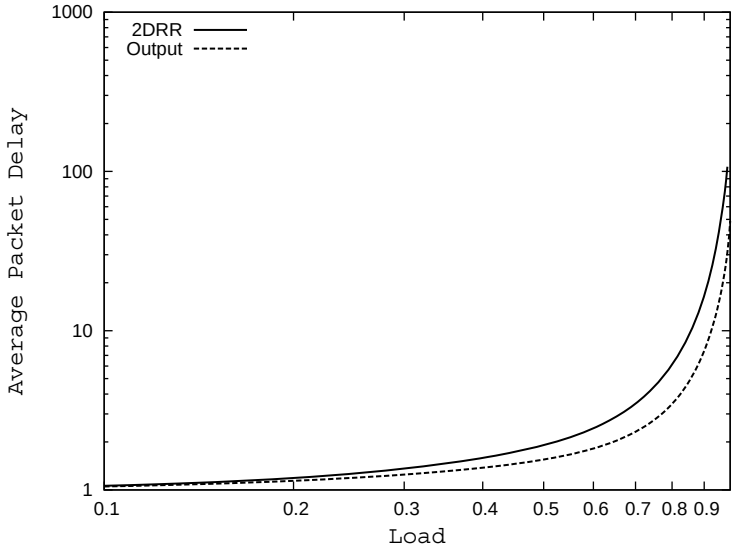
	0	1	2	3
0	1	0	0	1
1	0	1	1	0
2	0	1	0	1
3	1	1	1	0

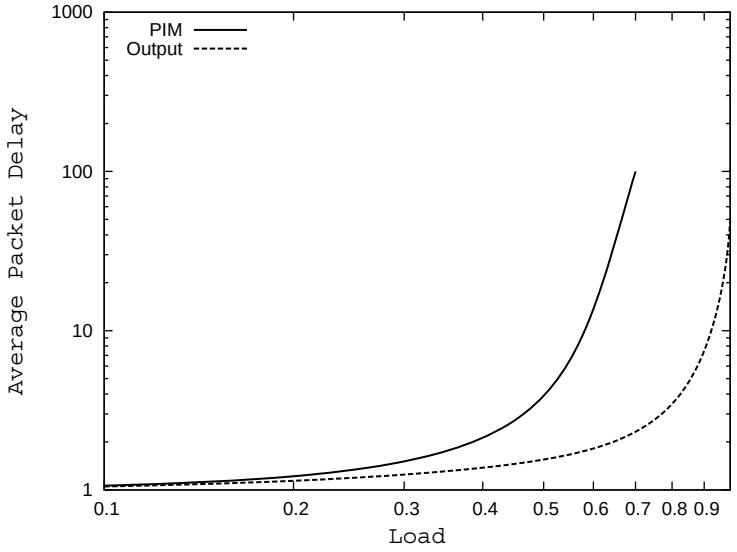
Pattern 3

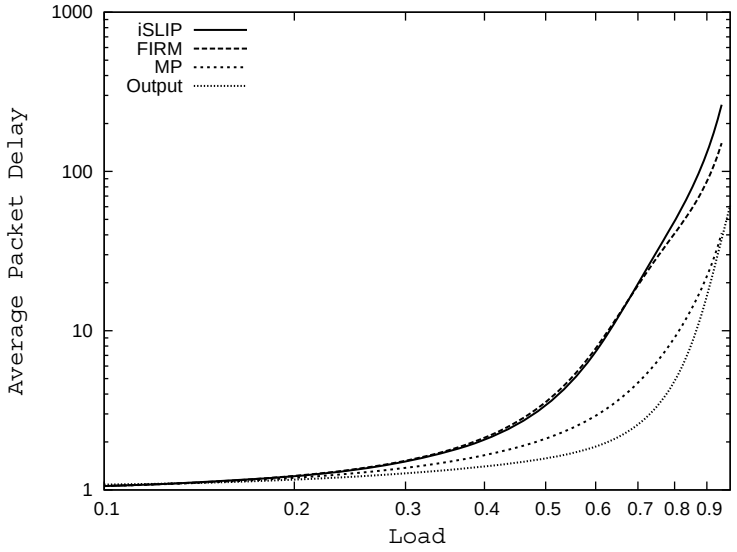
	0	1	2	3
0	1	0	0	1
1	0	1	1	0
2	0	1	0	1
3	1	1	1	0

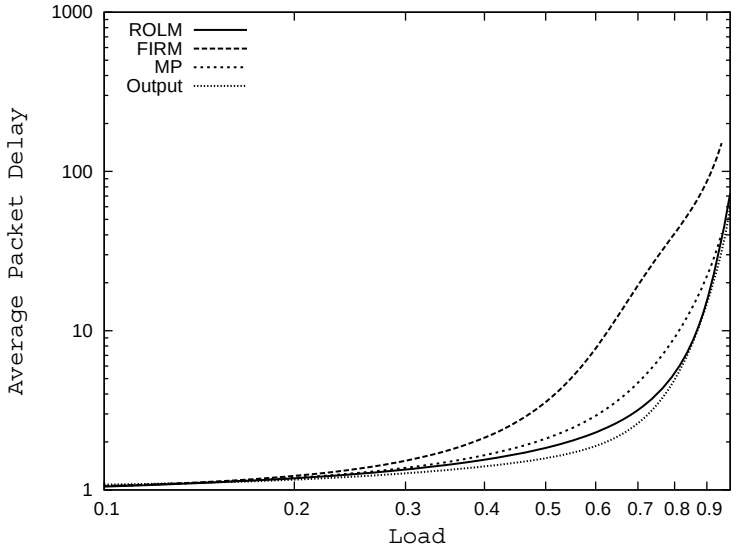
Pattern 2

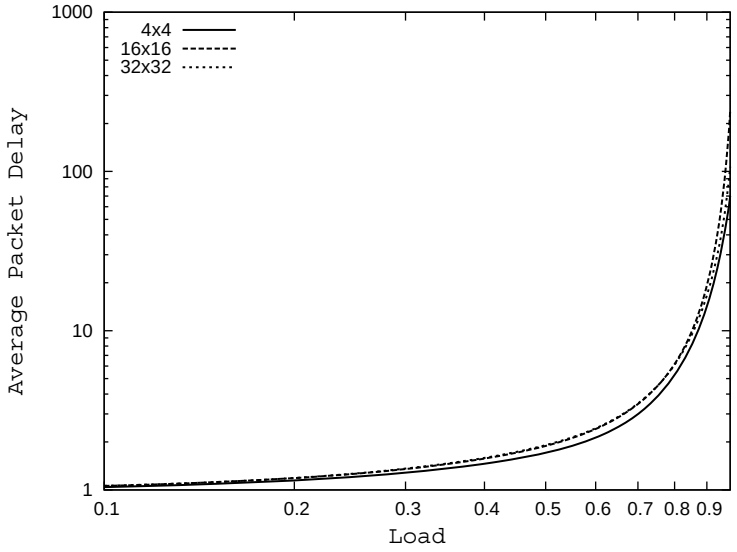
	0	1	2	3
0	1	0	0	1
1	0	1	1	0
2	0	1	0	1
3	1	1	1	0

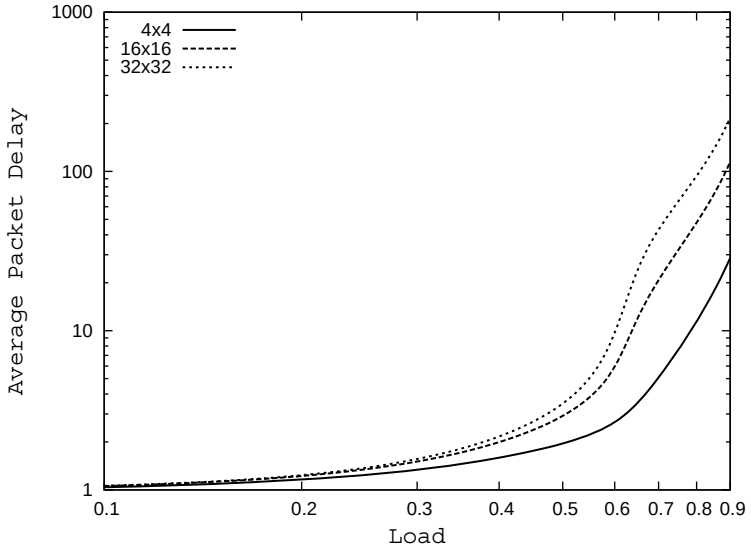

2DRR
Output
1000
100
10
1
Average Packet Delay
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Load

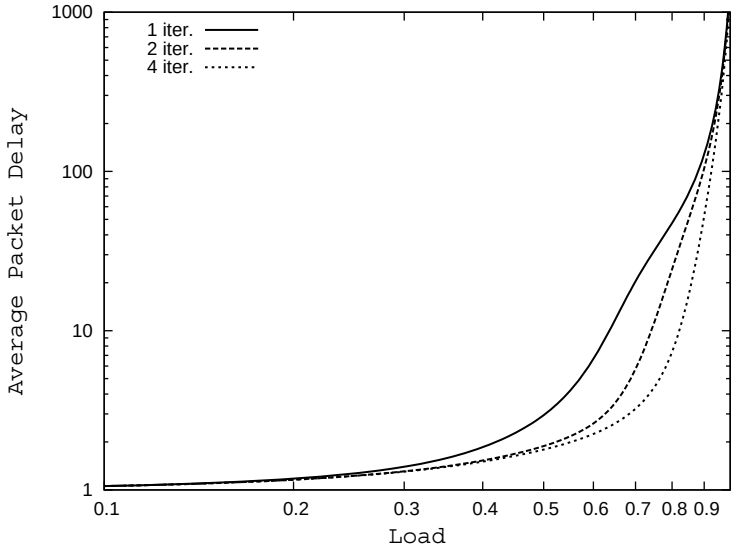

PIM
Output
1000
100
10
1
Average Packet Delay
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Load

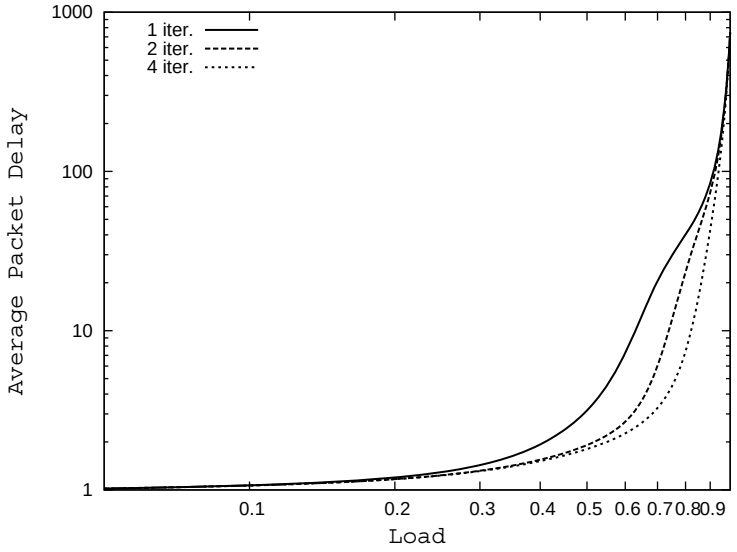

iSLIP
FIRM
MP
Output
1000
100
10
1
Average Packet Delay
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Load


ROLM
FIRM
MP
Output
1000
100
10
1
Average Packet Delay
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Load


4x4
16x16
32x32
1000
100
10
1
Average Packet Delay
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Load


1000
100
10
1
4x4
16x16
32x32
Average Packet Delay
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Load


1 iter.
2 iter.
4 iter.
1000
100
10
1
Average Packet Delay
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Load


1000
100
10
1
1 iter.
2 iter.
4 iter.
Average Packet Delay
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Load