

97-1089: Modifications to Appendix B and Sections 3.1.7 and 3.2.7 of Testing Baseline Text on Scalable Configurations

Arjan Durresti, Raj Jain, Gojko Babic, Justin Dolske

The Ohio State University

Contact: Jain@cis.ohio-state.edu

<http://www.cis.ohio-state.edu/~jain/>



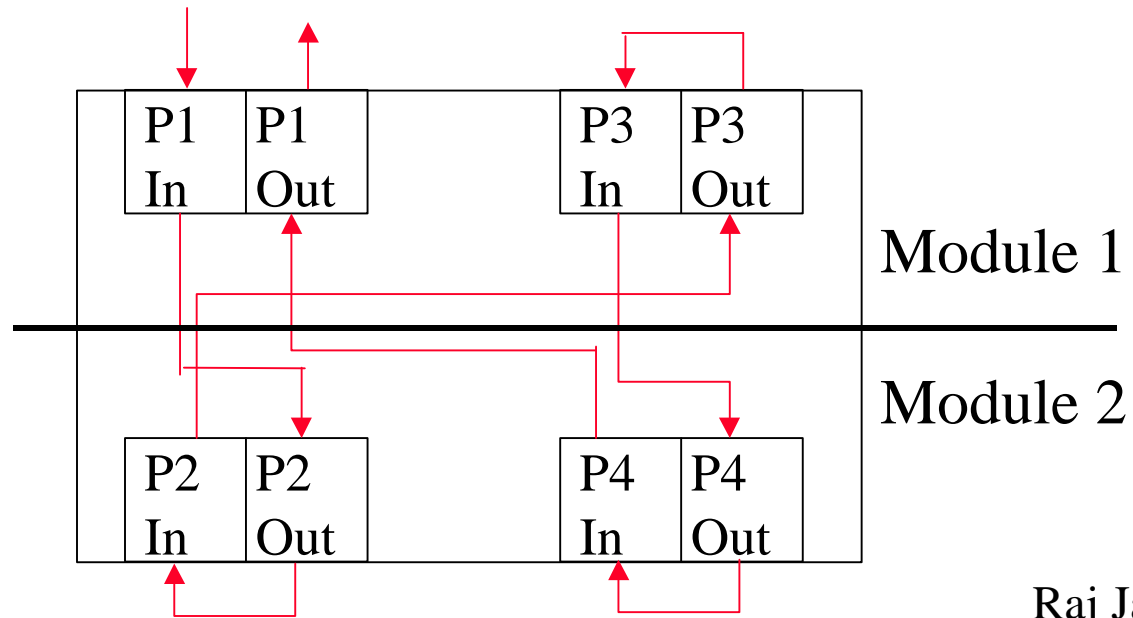
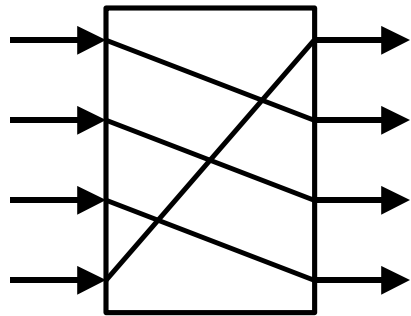
- ❑ Why these modifications?
- ❑ Methodology
- ❑ Examples

Scalable Configurations

- ❑ ATM testing equipment are expensive.
- ❑ Scalable Configurations permit to simulate the desired basic configuration using a limited number of generators.
- ❑ But there are many ways to set up the scalable connections configurations and the results could vary with the set up.

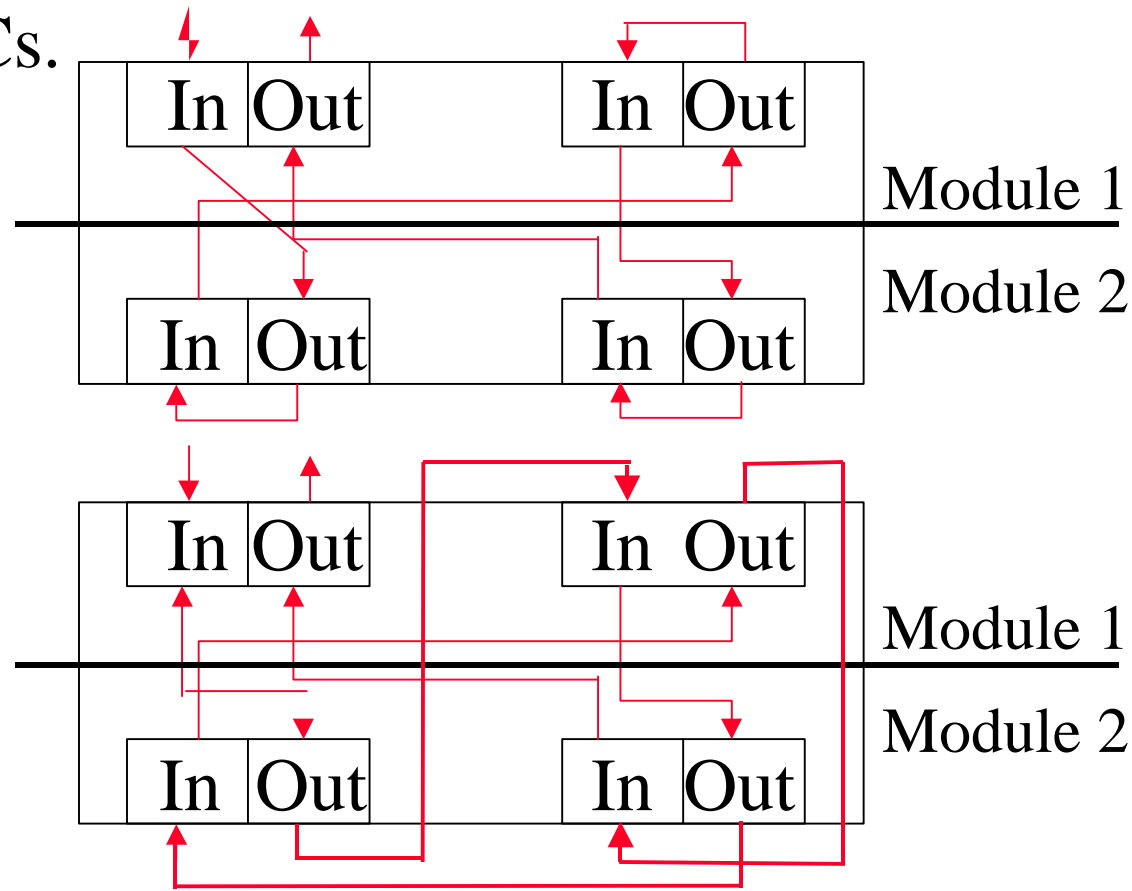
A Sample 4-to-4 Configuration

- Different implementations could provide different results.
- P1-P2-P3-P4-P1 Four module crossings
- P1-P3-P4-P2-P1 Two module crossings



Problem w/ Current Text

- Some switches set only bidirectional VCs
Can't have the same VCI on the same port for two VCs.
for two VCs.

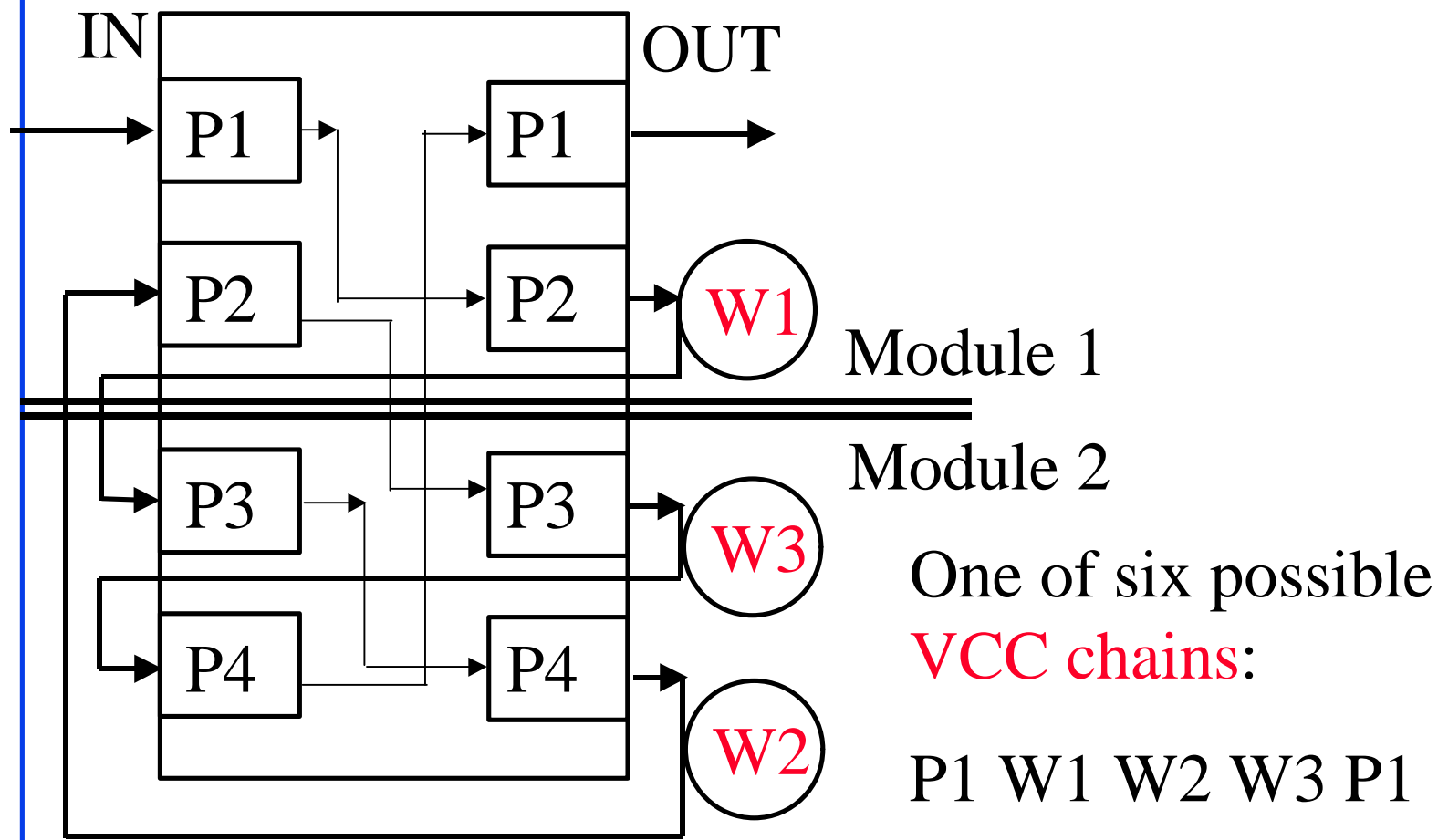


VCC Chain

- ❑ Performance testing requires setting up connections between ports of the switch.
- ❑ Some connections are internal through the switch fabric and others are external through wires or fibers.
- ❑ An external connection between two switch ports is referred in this appendix as a wire W.
- ❑ The sequence of concatenated connections (internal and external) is called a VCC Chain.
- ❑ The proposed algorithm permits to create standard VCC Chains for any number of generators and any number of ports \Rightarrow Scalable and basic (both)

Example

- 4-to-4 configuration with one generator



VCC Chain Implementation

- Implementation of External Connections
 1. Numbering the ports
 2. Identifying the ports connected to generators and analyzers
 3. Numbering the wires
- Implementation of Internal Connections

1. Port Numbering

Module #



1)	P1 P3 P5 P7 P9 P11 P13 P14	} Group 1
2)	P2 P4 P6 P8 P10 P12	
3)	P15 P16 P17 P18 P19 P20 P21 P22	Group 2
4)	P23 P24 P25 P26 P27 P28	Group 3

- ❑ Need to group modules by technology and speed
- ❑ This port numbering helps creating VCC chains that cross modules using a simple algorithm

2. Generator/Analyzer Ports

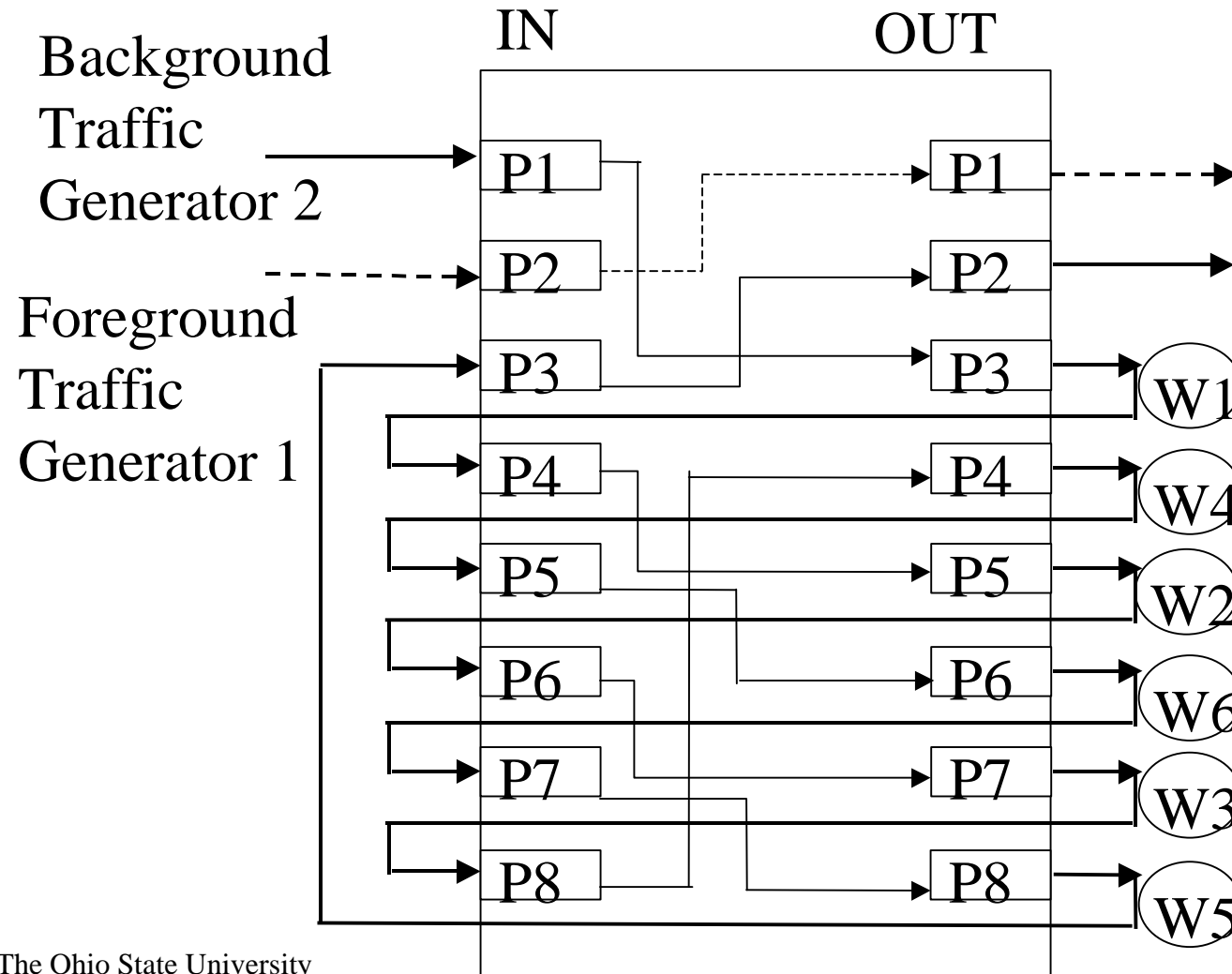
- ❑ Identifying the ports connected to the generator and/or analyzers
 - Avoid having only one port left over in a group. (That port cannot be connected externally to any other port)
 - This condition does not apply if the switch allows loopbacks.
- ❑ Note: The algorithm works with loopbacks also.

3. Numbering the Wires

- ❑ In each group start with the first output port available. Connect it to the next port whose input is available. (Note: With loopbacks, the output of a port can be connected to the input of the same port. The rest of the methodology is same.)
- ❑ Continue until all ports have been connected.
- ❑ Numbered the wires sequentially as W_1, W_2, \dots with the restriction that the end of wire W_i and the beginning of $W_{(i+1)}$ must be different ports.
- ❑ May need to skip some wires and include them in the next round.

Example

- Straight 7-to-7, 1 Gen.



Algorithm

```
f = 1
for (k = 1 to r, step 1)
  { if(k>1) f = 1 +  $\sum_{d=1}^{k-1} NW(d)$ 
  for (j = 1 to m, step 1)
    { if(j>1) f = mod*(CH(1,j-1,k)+1, TNW);
    for (i = 1 to NW(k), step 1)
      {
        CH(i,j,k)=W(f);
        f = mod*(f+1, TNW);
      } end for i
    } end for j
  } end for k.
```

Algorithm Rules

- ❑ Each chain generally goes sequentially from wire i to wire $i+1$ unless the wire has already been fully used by other chains. Use modulo N arithmetic.
- ❑ Multiple Chains/Generator: Each new VCC chain is obtained from the previous one shifting by one its wire number
- ❑ Multiple Generators: Divide the wires between the generators. Each generator will start its traffic from its wires.

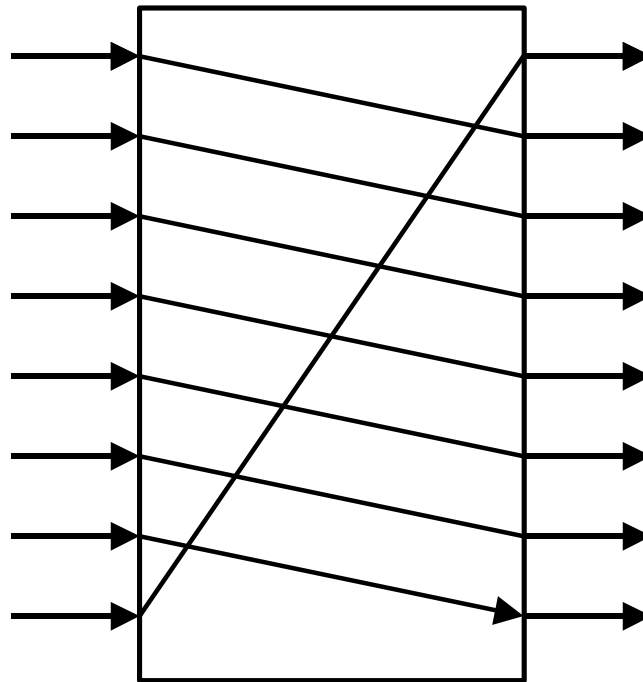
Throughput and Latency Measurements

- ❑ Performance testing requires two kinds of virtual channel connections (VCCs): foreground VCCs (traffic that is measured) and background VCCs (traffic that simply interferes with the foreground traffic).
- ❑ We need in throughput measurements foreground traffic, and both foreground and background traffic in latency measurements.

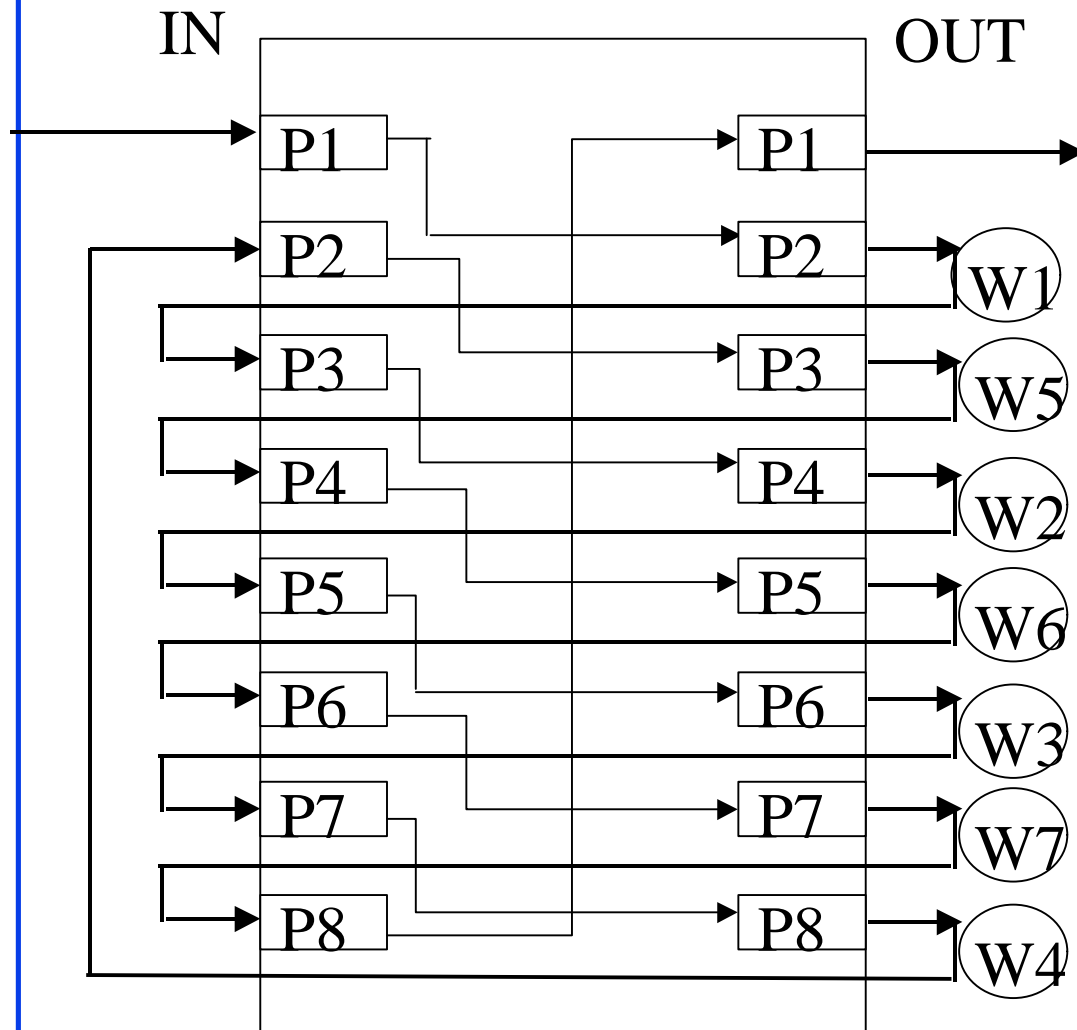
Throughput and Latency Measurements (Cont)

- ❑ Foreground traffic in Latency measurements uses only two ports, one source and one destination.
- ❑ For scalable configurations in Latency Measurements, foreground and background traffic share ports in opposite directions.

8-to-8 Straight



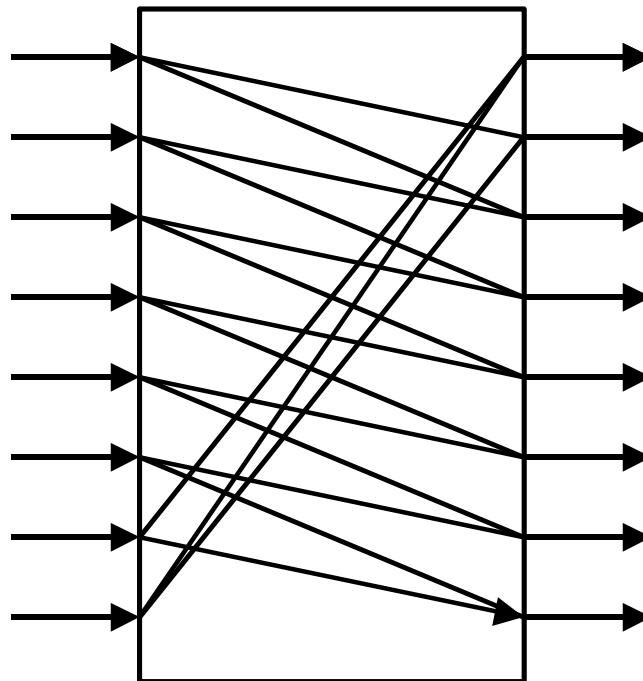
8-to-8 Straight, 1 Gen.



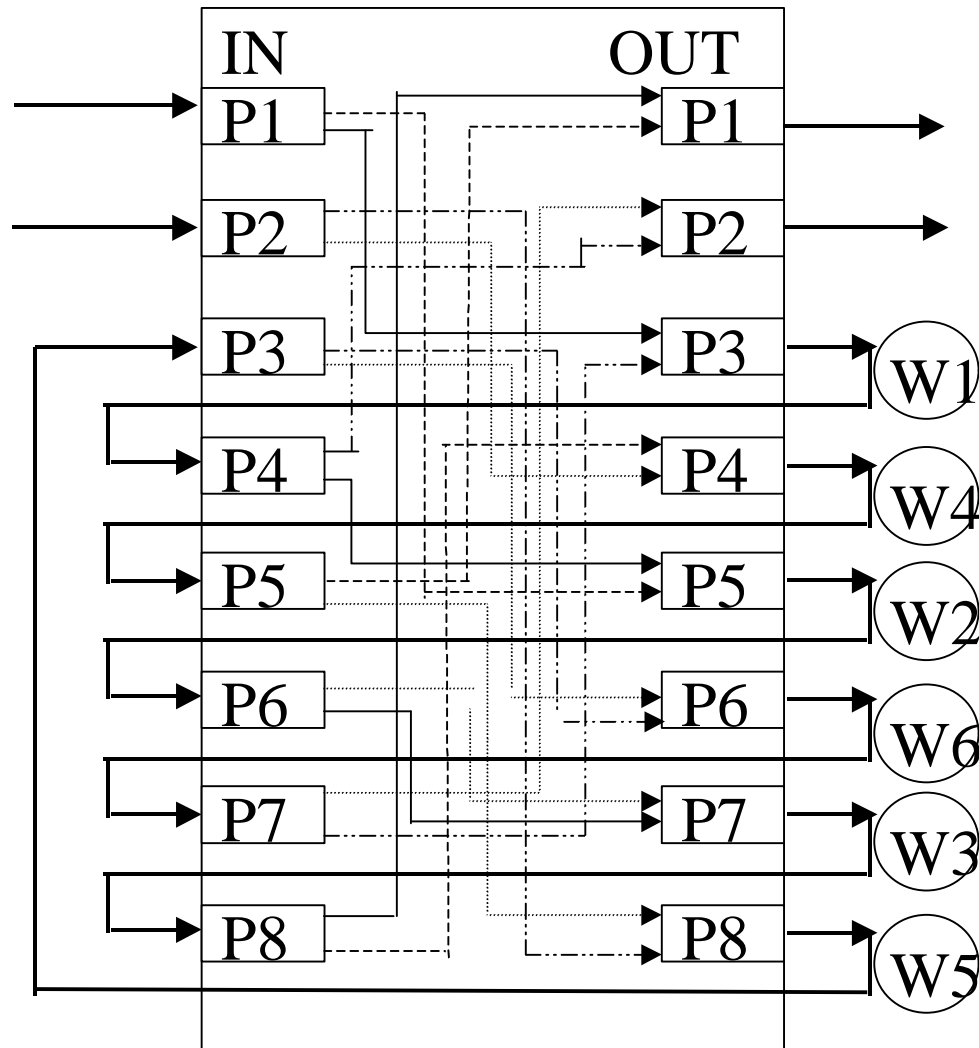
Throughput
Foreground
Traffic

VCC chain is:
P1-W1-W2-W3-W4-
W5-W6-W7-P1.

8-to-2 Partial Cross Throughput Foreground



8-to-2 Partial Cross, 2 Gen.



Throughput
Foreground
Traffic

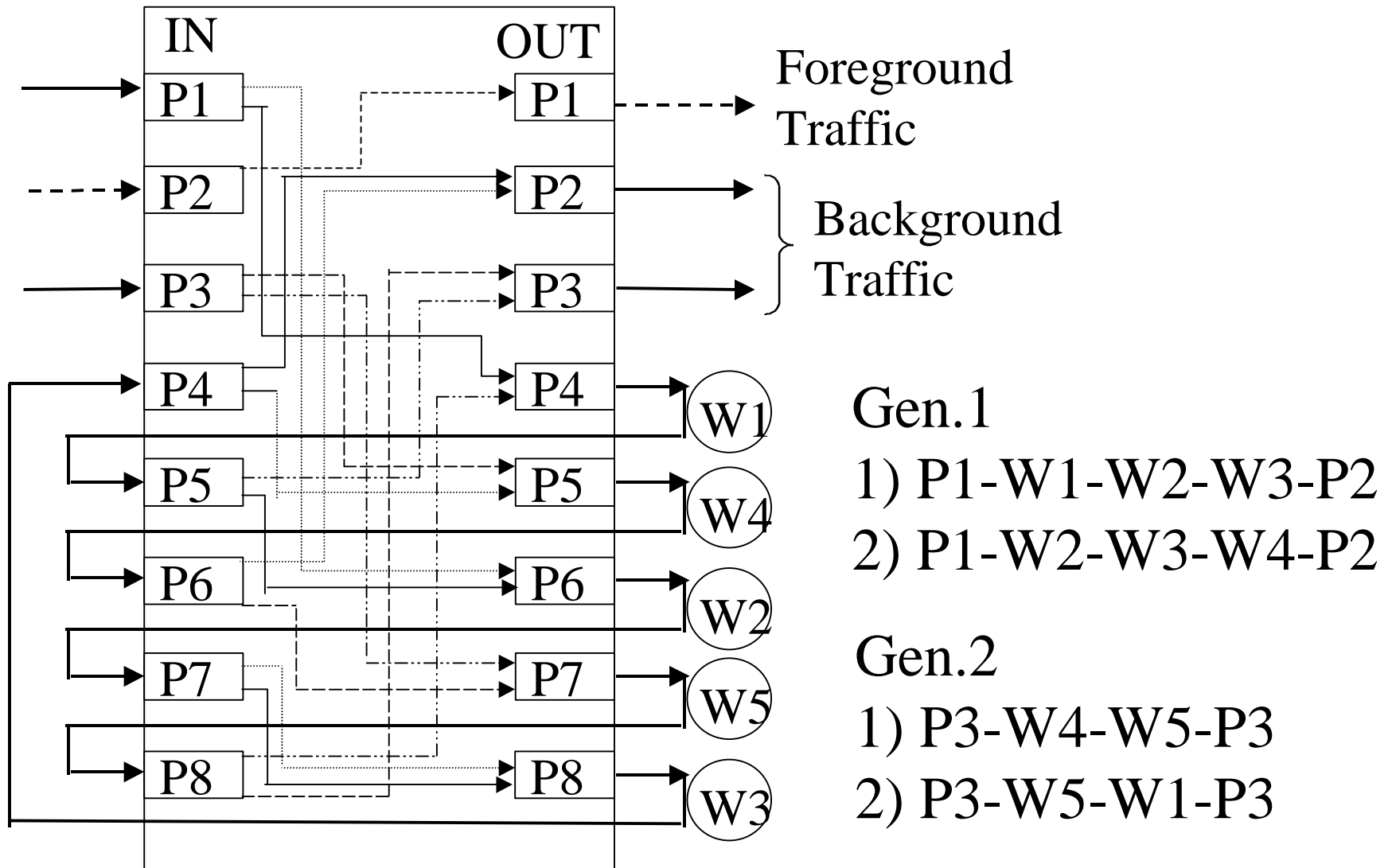
Gen.1

- 1) P1-W1-W2-W3-P1
- 2) P1-W2-W3-W4-P1

Gen.2

- 1) P2-W4-W5-W6-P2
- 2) P2-W5-W6-W1-P2

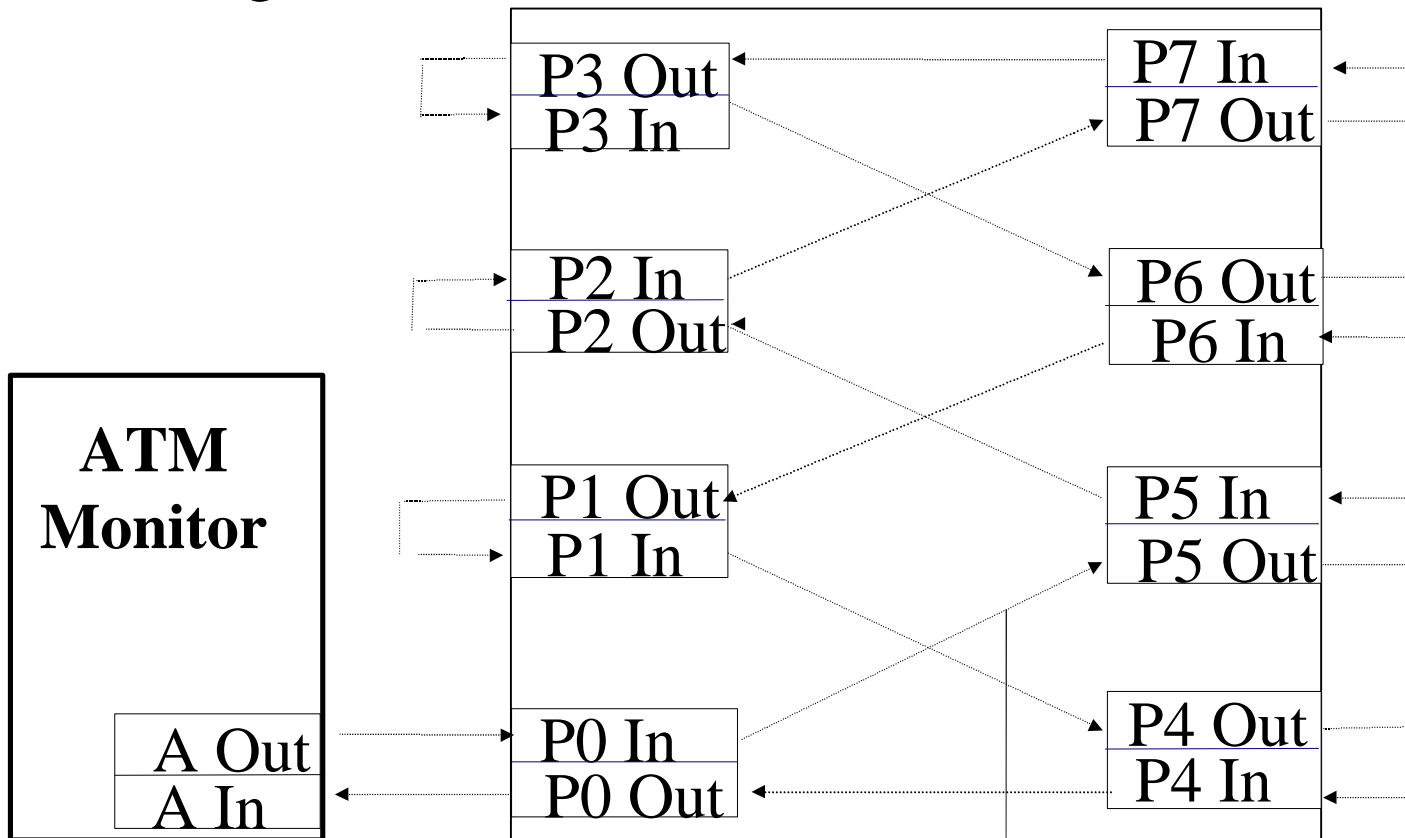
7-to-2 Partial Cross, 2Gen.



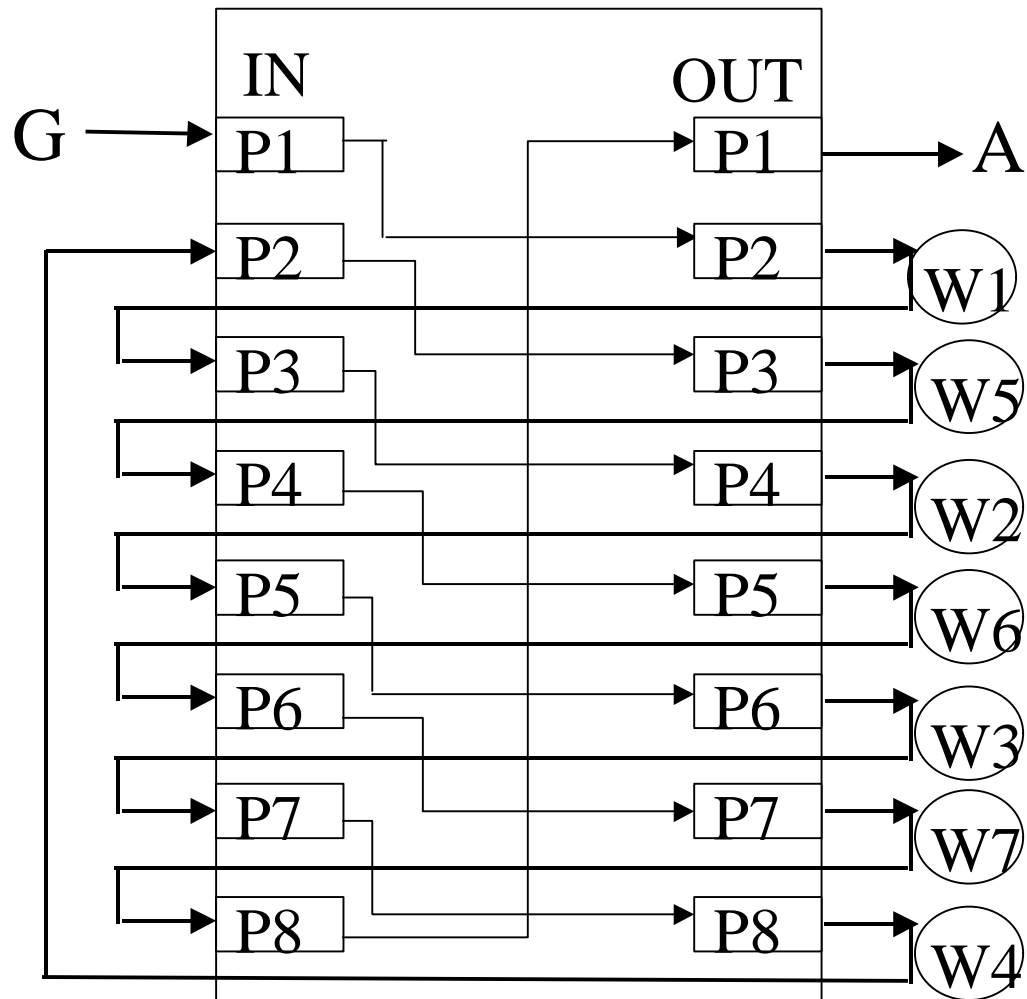
Modifications to Sections

3.1.7 and 3.2.7

- Existing Figure 3.3: 8-to-8 straight configuration, 1 Gen.



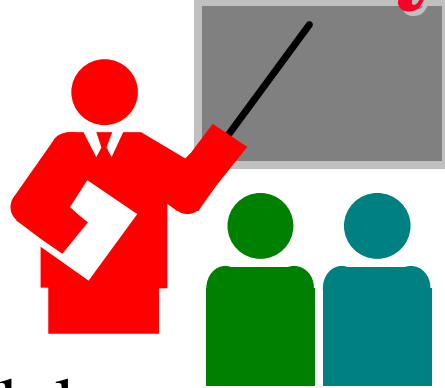
New Figure 3.3



Modifications to Sections 3.1.7 and 3.2.7 (Cont.)

- ❑ Similarly, change Figure 3.4 and 3.5
- ❑ Replace “loopbacks” by “wires”
- ❑ Exchange “w” and “n” for consistency
Throughout the document: $n = \#$ of ports.

Summary



- New Methodology:
 - Allows both loopback and non-loopback external connections.
 - Allows any number of generators.
 - ℙ Can be used for both scalable and basic configurations.
 - Algorithm can be implemented as a computer program.

Motion

- ❑ Adopt the text of 97-1089 as Appendix B of Performance Testing Baseline Text.
- ❑ Adopt the appropriate modifications to Section 3.1. and 3.2.7 of the Baseline text.