

97-0612

Revised MIMO Definition

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Frame Latency

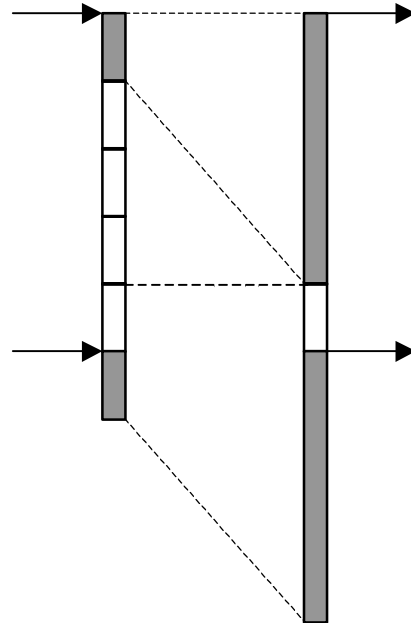
- ❑ MIMO = FILO - NFOT
- ❑ NFOT = Normalized Frame Output Time
- ❑ Old Definition:
NFOT = Frame input time \times Output rate/Input Rate
- ❑ New Definition:
NFOT = FILO latency through a zero-delay switch
- ❑ Initially $NFOT = 0$ and time t is measured from the arrival of the first bit of the first cell.
- ❑ For each cell with its first bit arriving at time t
 $\Rightarrow NFOT = \max\{t, NFOT\} + CT.$
- ❑ $CT = \text{Max}\{\text{Cell input time, Cell output time}\}$

Example 1

- Input rate $>$ Output rate
- CT = Cell Output Time = 4
- 2nd cell at 5: NFOT = $\max\{5, 4\} + 4 = 9$

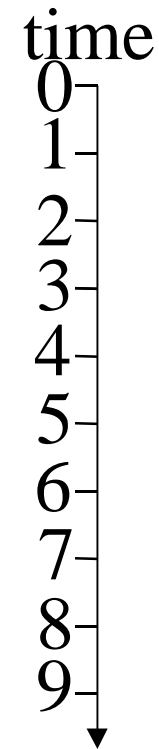
First bit of
cell arrives

First bit of
cell arrives



First bit of cell
transmitted

First bit of
cell transmitted

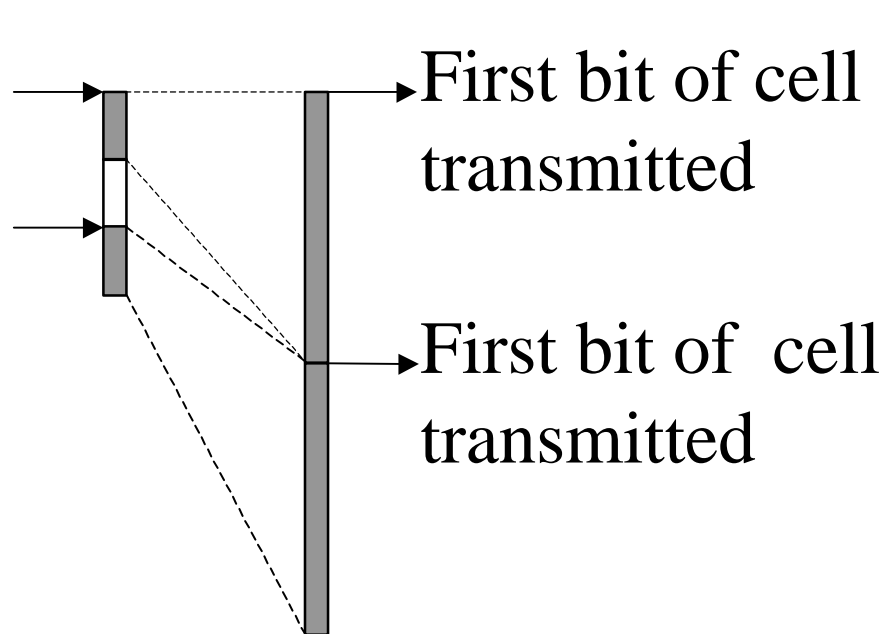


Example 2

- Input rate $>$ Output rate
- $CT = \text{Max}\{1, 4\} = 4$
- 2nd Cell arrival at 2: $\text{NFOT} = \text{max}\{2, 4\} + 4 = 8$

First bit of
cell arrives

First bit of
cell arrives



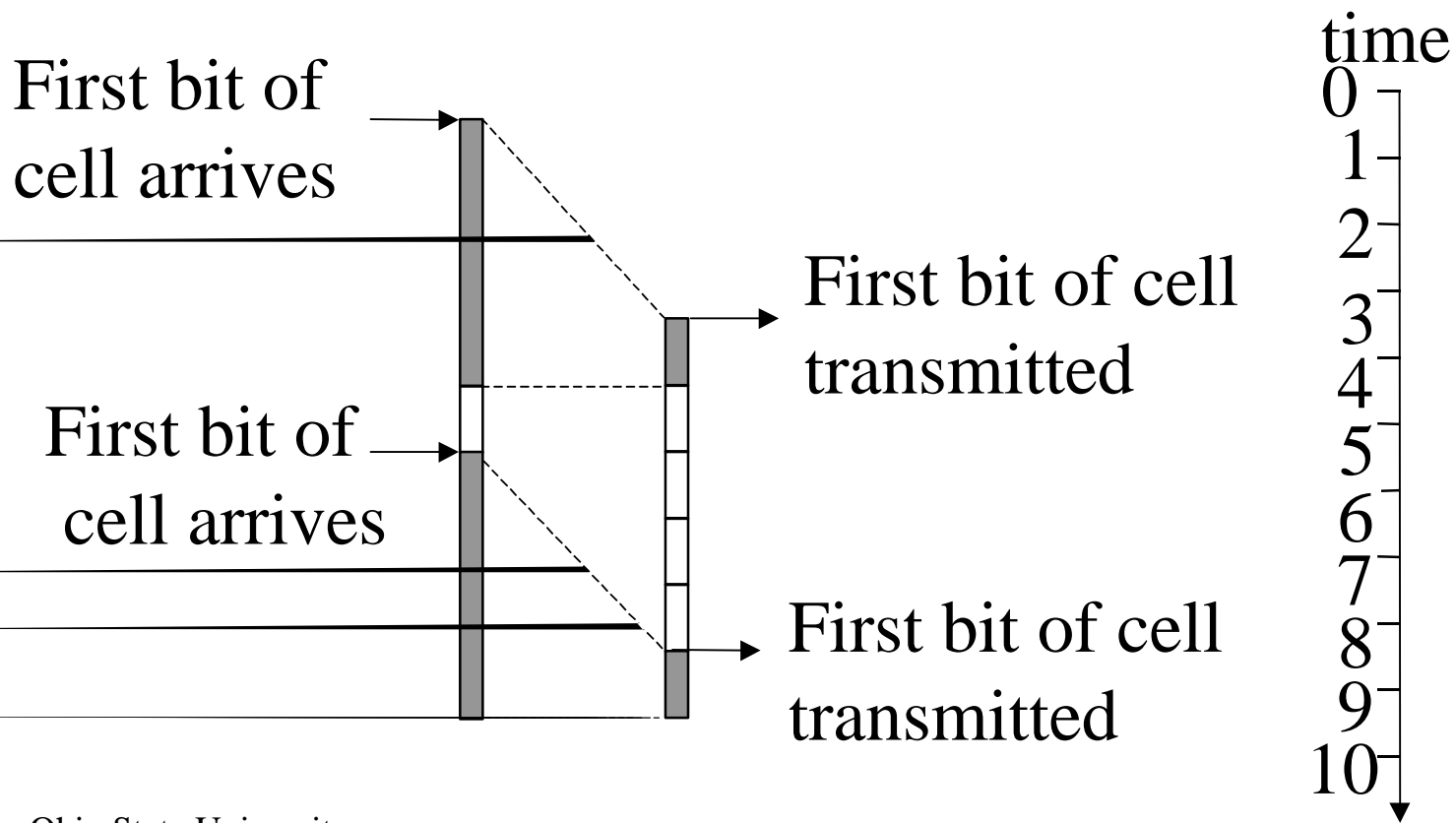
time

0
1
2
3
4
5
6
7
8
9



Example 3

- Input rate < Output rate

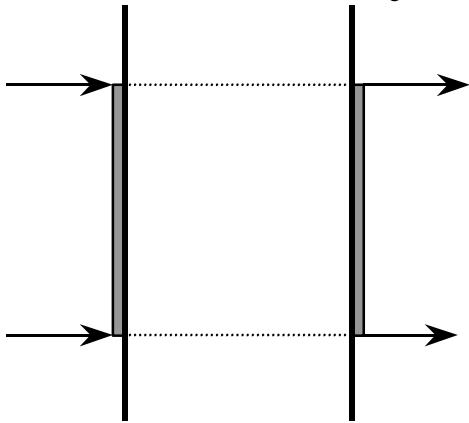


Revised MIMO Latency

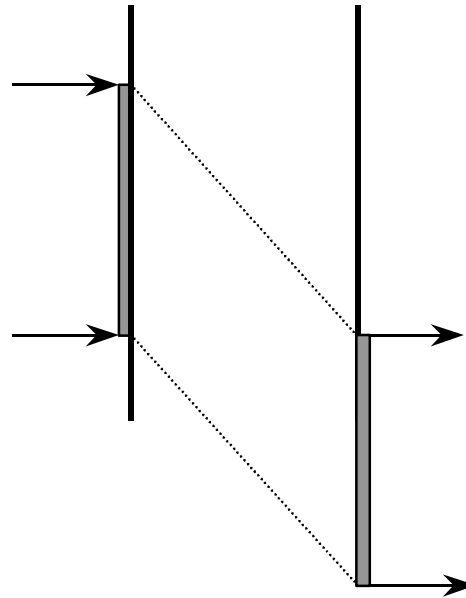
- ❑ MIMO Latency = *FILO Latency* - *NFOT*
- ❑ *FILO latency* = Time between the first bit entry and the last bit exit
- ❑ *NFOT* = Nominal Frame Output Time: the time a frame needs to pass through the zero-delay switch, calculated as:
Initially $NFOT = 0$ and time t is measured from the arrival of the first bit of the first cell. For each cell with its first bit arriving at time t
 $\Rightarrow NFOT = \max\{t, NFOT\} + CT.$
- ❑ $CT = \text{Max}\{\text{cell input, cell output time}\}$

Key Difference

□ Zero-Delay Switch:



(a) Ours



(b) Theirs

- Calling “b” a zero-delay switch will make better switches negative delay switches.

7. Wire

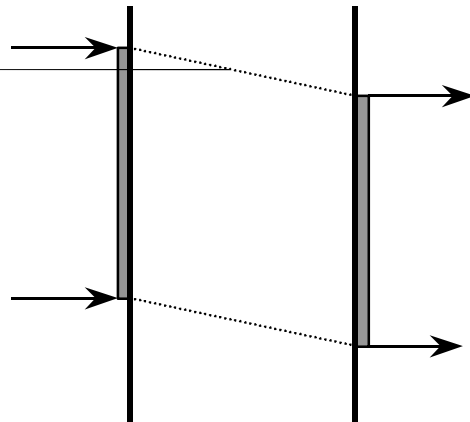
1 m long wire, 64 kbps



- ❑ Ours: 5 μ s
- ❑ Theirs: -6.630 ms

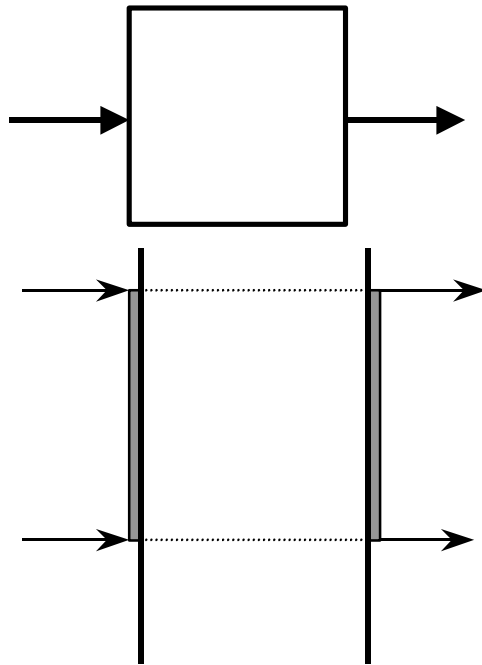
6. Cut-Through Switches

- ❑ Cut Through = A switch that looks at the 5-byte header and starts switching.
- ❑ At 64 kbps: 5 B = 0.625 ms, 53 B = 6.625 ms



Our: 0.625 ms
Their: -6 ms

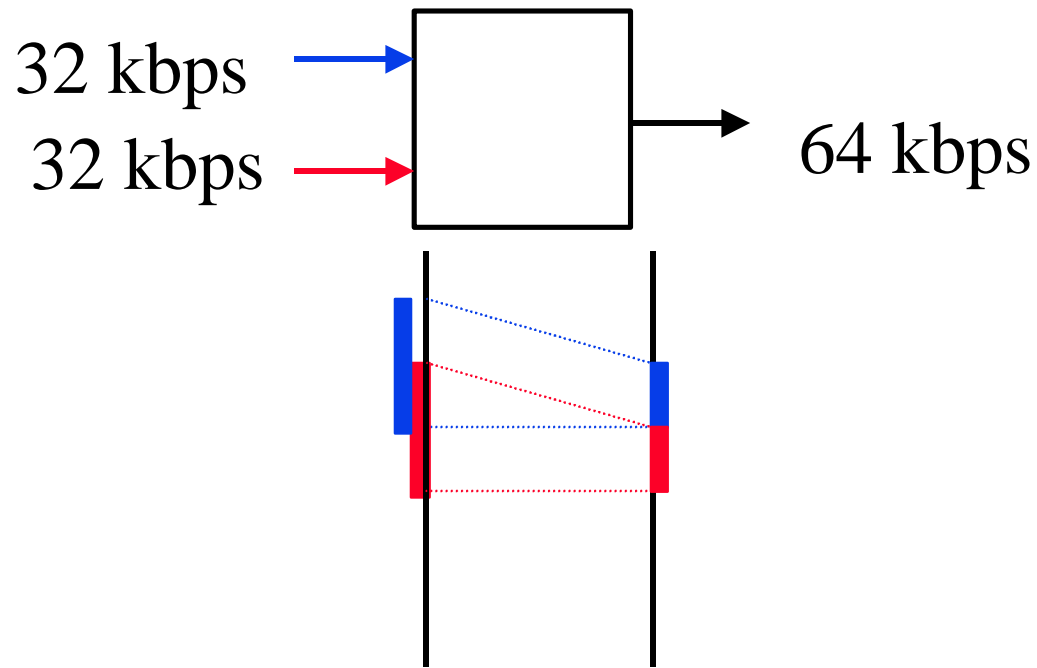
5. Repeaters



Our: 0 ms

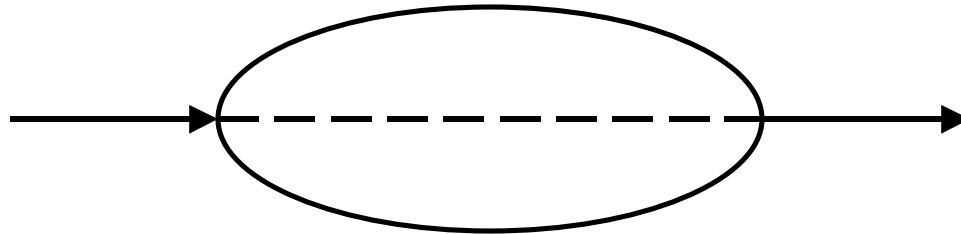
Their: - 6.625 ms

4. Multiplexers



Our: 0 ms
Their: - 6.625 ms

3. A Network



- If their definition does not apply to multiplexers or wires, it will not apply to networks that have only these.

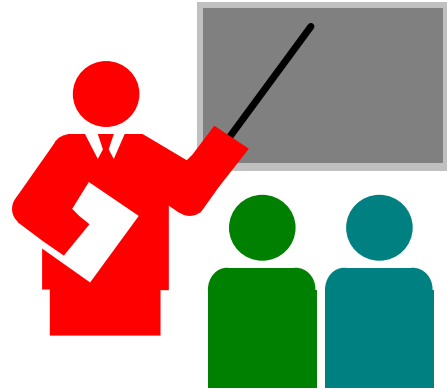
2. Frame Switches

- ❑ They define all 1-cell delay switches as zero-delay switches.
- ❑ Are all 1-frame delay switches also zero-delay switches?
- ❑ If yes, then what about cut-through frame switches? Most frame switches now a days use cut-through and will have negative delay by their definition.
- ❑ Their definition does not extend to frame (non-cell) switches.
- ❑ Why apply a definition that does not apply to other units of information?

1. No Negative Delay

- ❑ If you use our definition, no switch can have negative delay
- ❑ If you use their definition, all our zero delay switches have negative delays by their definition.
- ❑ All our zero-delay switches are feasible.

Motion



- ❑ Adopt the text under heading “Proposed Revised Text for Section 3.2.1” of 97-0612 to replace section 3.2.1 of Performance Testing Baseline Text.