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Revised MIMO Definition

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Frame Latency

- MIMO = FILO - NFOT
- NFOT = Normalized Frame Output Time
- Old Definition:
  \[ NFOT = \text{Frame input time} \times \frac{\text{Output rate}}{\text{Input Rate}} \]
- New Definition:
  \[ NFOT = \text{FILO latency through a zero-delay switch} \]
- 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 \( t \)
  \[ NFOT = \max\{t, NFOT\} + CT. \]
- \( CT = \text{Max}\{\text{Cell input time, Cell output time}\} \)
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
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 transmitted
Example 3

- Input rate < Output rate

First bit of cell arrives

First bit of cell transmitted

First bit of cell arrives

First bit of cell transmitted

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Revised MIMO Latency

- MIMO Latency = \( \text{FILO Latency} - \text{NFOT} \)
- \( \text{FILO latency} \) = Time between the first bit entry and the last bit exit
- \( \text{NFOT} \) = Nominal Frame Output Time: the time a frame needs to pass through the zero-delay switch, calculated as:
  Initially \( \text{NFOT} = 0 \) 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 \( t \)
  \( \Rightarrow \text{NFOT} = \max\{t, \text{NFOT}\} + \text{CT} \).
- \( \text{CT} \) = Max \{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 µs
- 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
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 uqe 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.