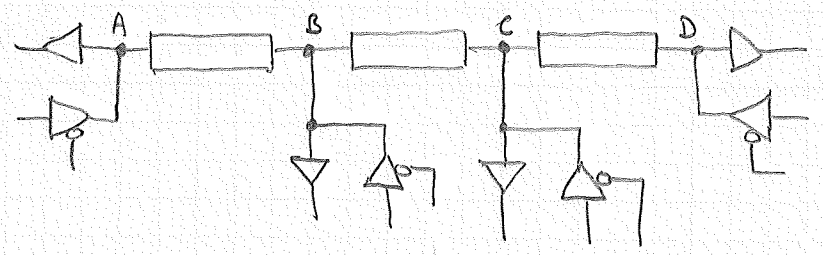
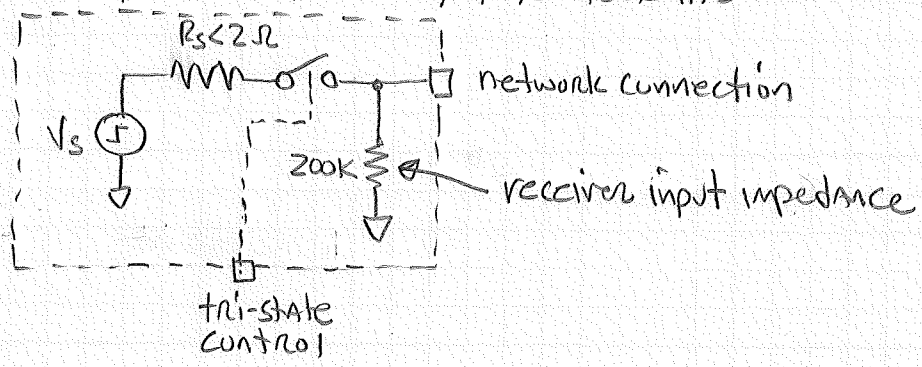
1



DRIVER/RECEIVER PAIR @ A, B, C, D look like:



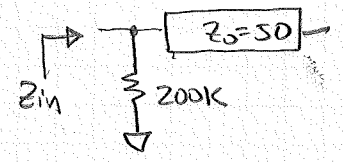
There are a number of situations to check at the different points on the line.

(a): The low output impedance of the driver will launch a full-sized incident wave down the line as

$$V_{inc} = V_S\left(\frac{50}{50+2}\right) = 0.961 V_S \quad \text{(Roughly full-sized)}$$

If left-most driver is the only one enabled, the other taps on the line are only listening. They are thus high-Z points.

At points B + C, reflections may be generated. How big are they? At both B + C, a wave will see:



thus $Z_{in} = 50 \,||\, 200K$
$= 49.99\Omega$

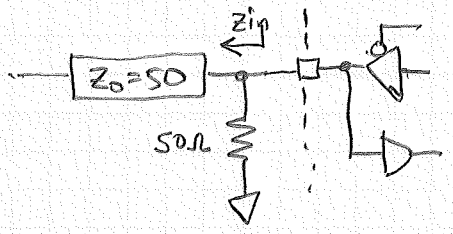
thus $\rho_{||} \approx \phi$

No reflections will occur @ points B + C. The full size incident wave will correctly be received at points B + C, and no reflections will be generated, thus no termination is required.

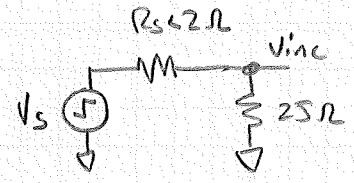
(b) When the full-size wave reaches point (d), a 2(Vinc) reflection will be generated. If this travels back down the line, the input threshold to the receivers will be violated.

It appears that a 50Ω termination resistor is needed at point (D). That will eliminate any reflection; thus the receiver inputs will be within specification.

But, now, can the driver @ D drive the new network connection? Now, it looks like:



So, looking into the network, the driver at point D sees a 25Ω load now instead of 50Ω. Can it still launch an incident wave large enough to operate the receivers?

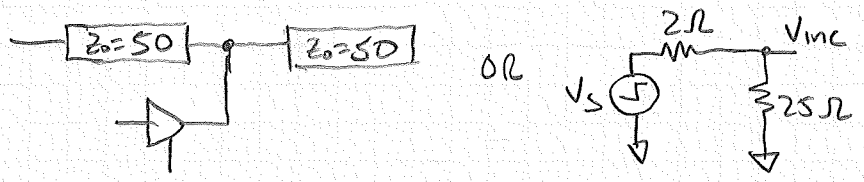


Another voltage divider...

$$V_{inc} = V_s\left(\frac{25}{25+2}\right) = 0.926V_s$$

So yes, the driver at D can still launch a ≈ full-size incident wave and its receiver still sees the full-size incoming wave with no problems.

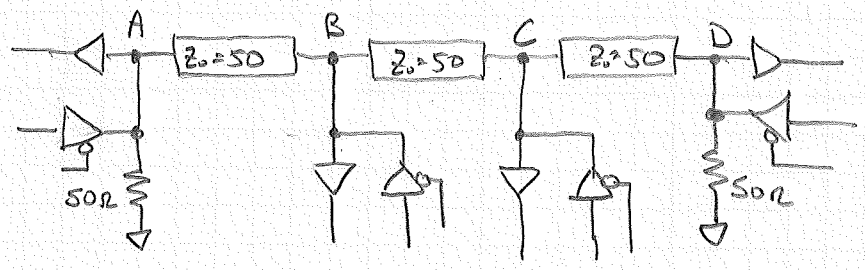
(c) What about the midpoint connections? We have already guaranteed full-sized incident wave switching with no reflections at B+C for the receivers. But can the drivers drive the line successfully? The load they see is:



We have seen already that our drivers can successfully drive 25Ω loads; so no problem @ B+C for either drivers or receivers.

(d) However, if drivers @ B, C, or D drive the line, we must also terminate at point A to prevent reflections. That completes the analysis.

The network would look like:



50Ω terminations are needed only @ A & D