

7th Annual eBeam Initiative Luncheon

SPIE – February 24, 2015

Aki Fujimura

CEO – D2S, Inc.

Managing Company Sponsor – eBeam Initiative

40+ Member Companies & Advisors



www.ebeaminitiative.org



GLOBALPHOTONICS



Welcome
Holon and Photonics!



John Chen
NVIDIA



Harris



Riko Radojic
Qualcomm



Jean-Pierre Geronimi
ST

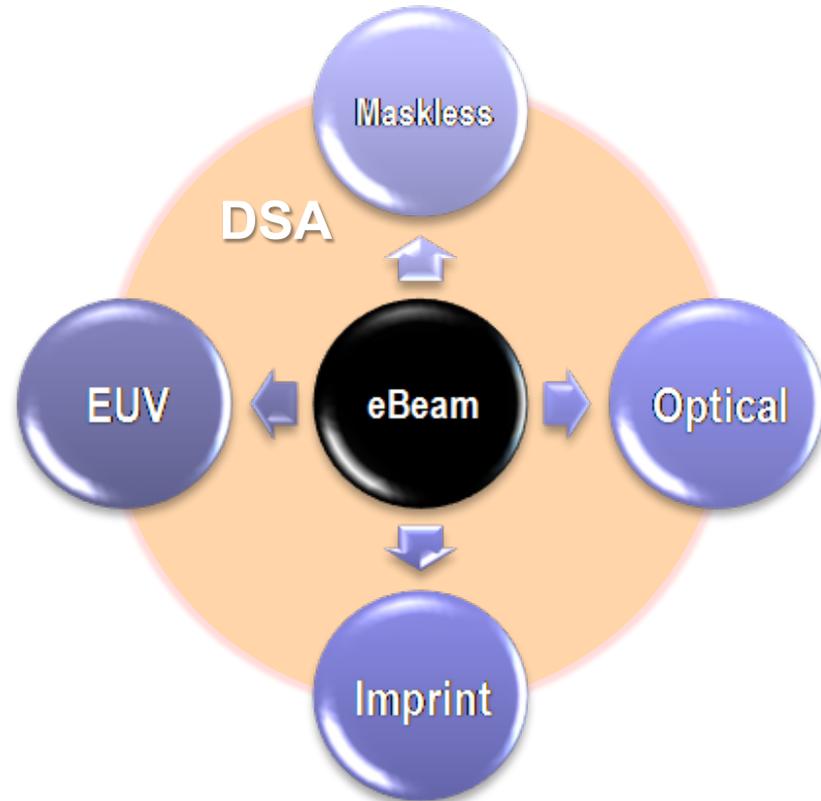


Hugh Durdan
Xilinx

eBeam Writes All Chips

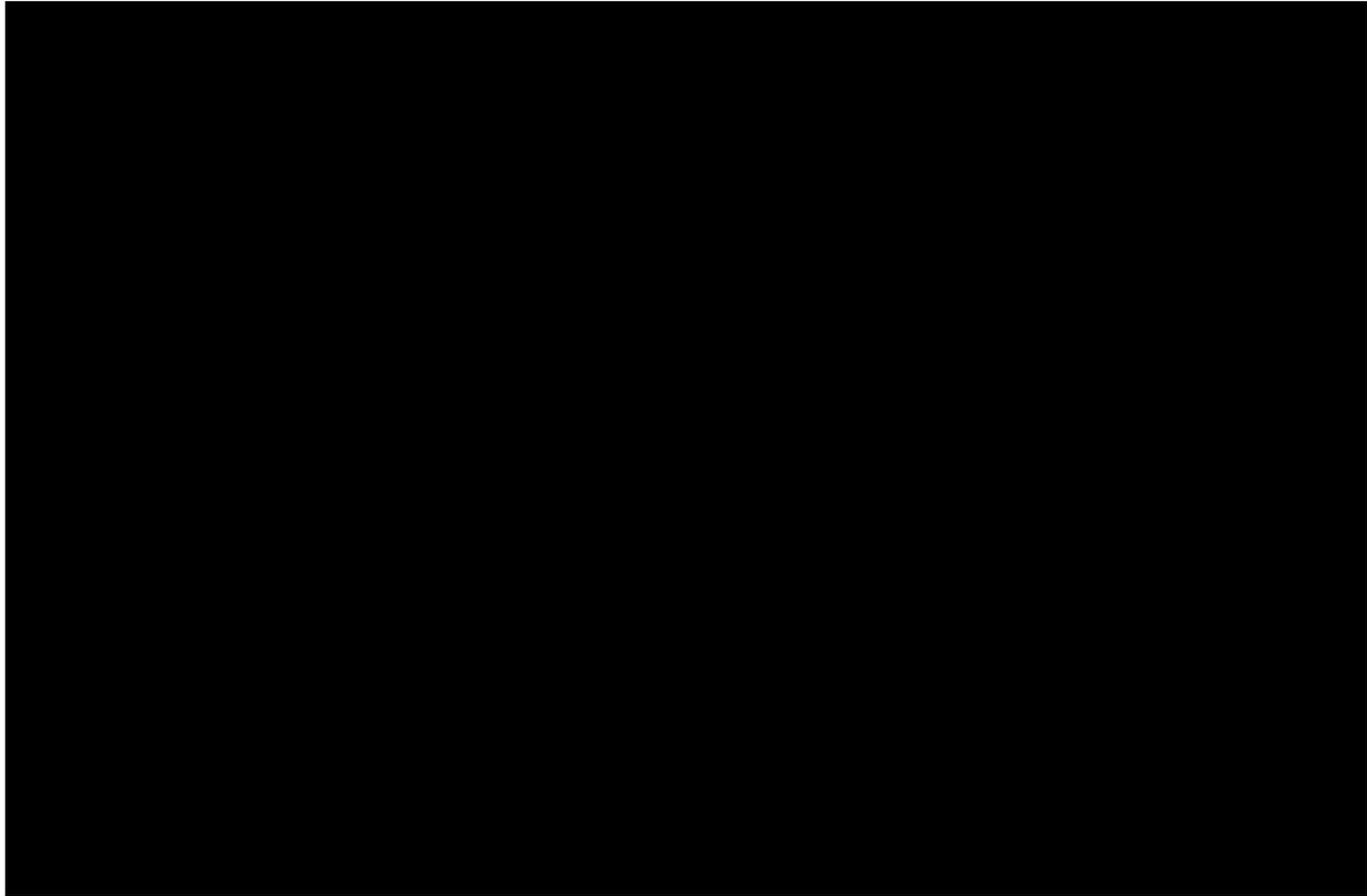
The eBeam Initiative:

- Is an educational platform for eBeam technology and its impact on all lithography approaches
- Open to any company in the semiconductor design chain with an interest in eBeam technologies



Colin Harris, COO PMC Sierra

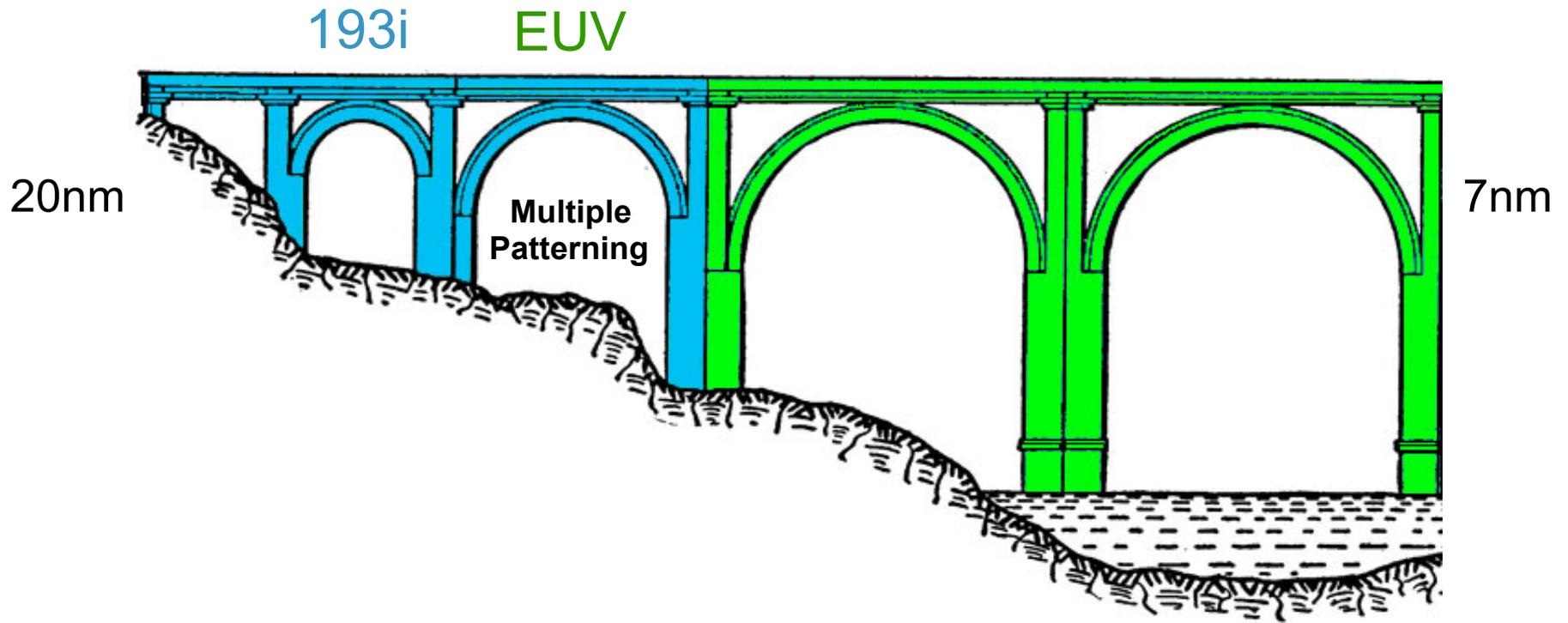
A Chipmaker's Perspective on Moore's Law



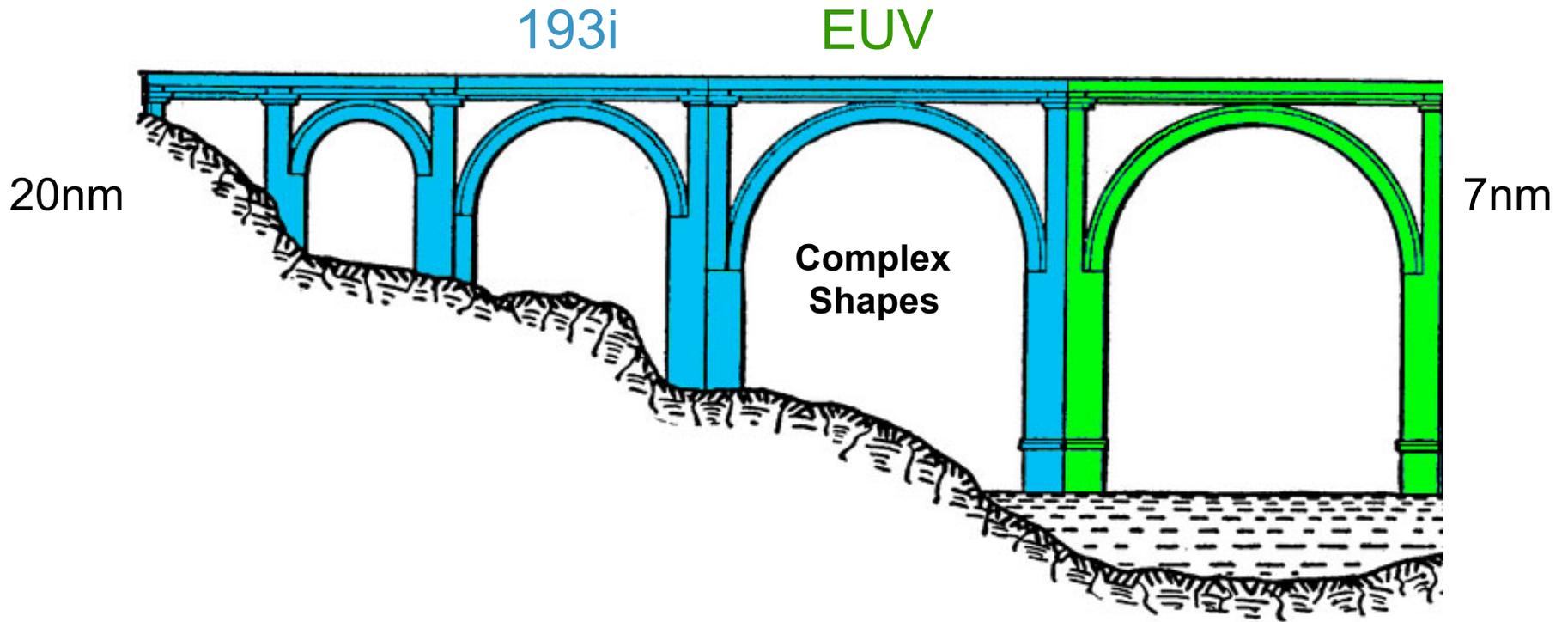
How Can the SPIE Community Help?

- **EUV, DSA, NIL**
- **Restrictive design rules**
- **Direct-write / complimentary eBeam**
- **Multiple patterning**
- **ILT**
 - complex shapes
- **Multi-beam**
- **Simulation-based processing**

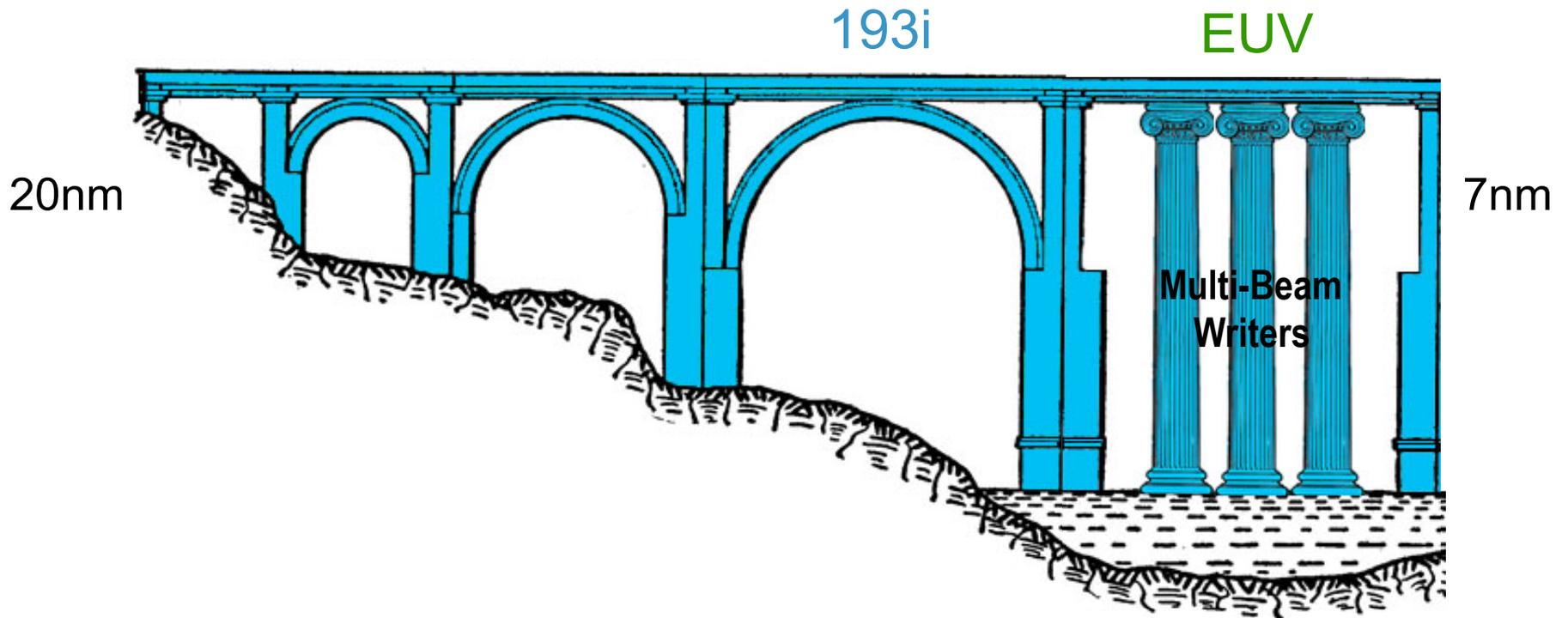
Keeping the Bridge to the Next Node Intact



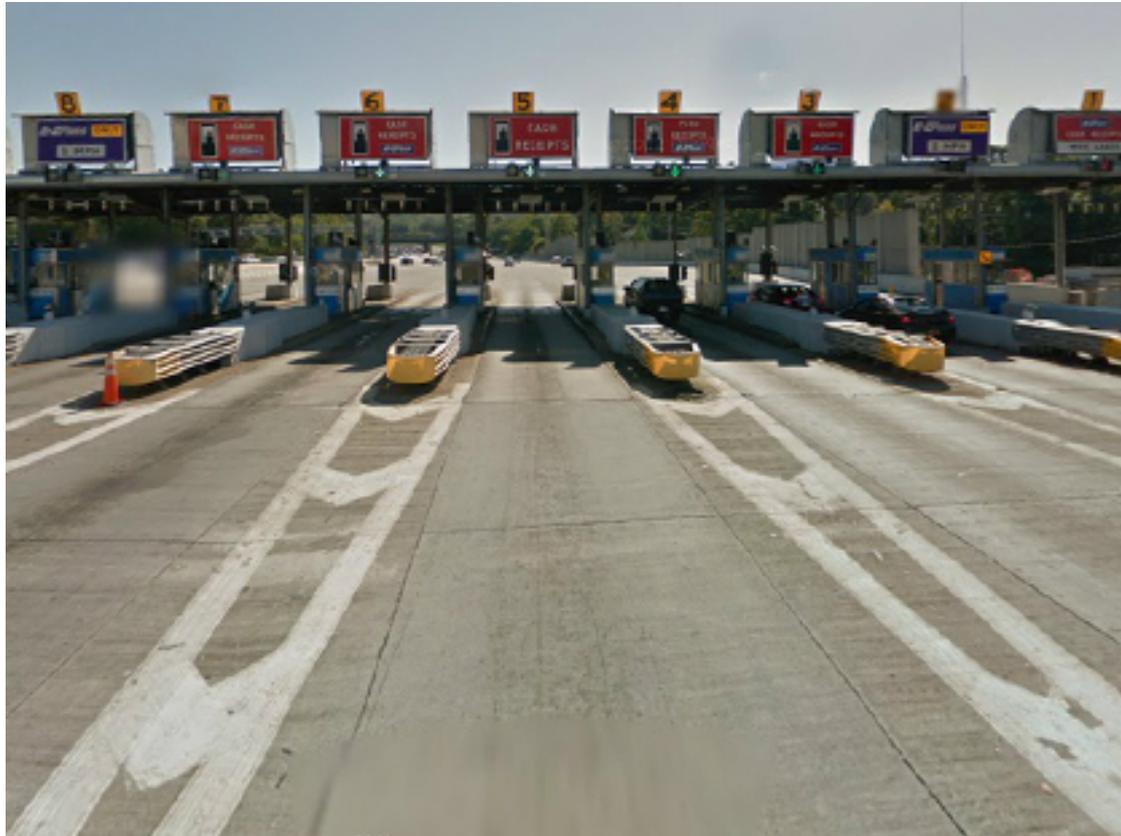
Keeping the Bridge to the Next Node Intact



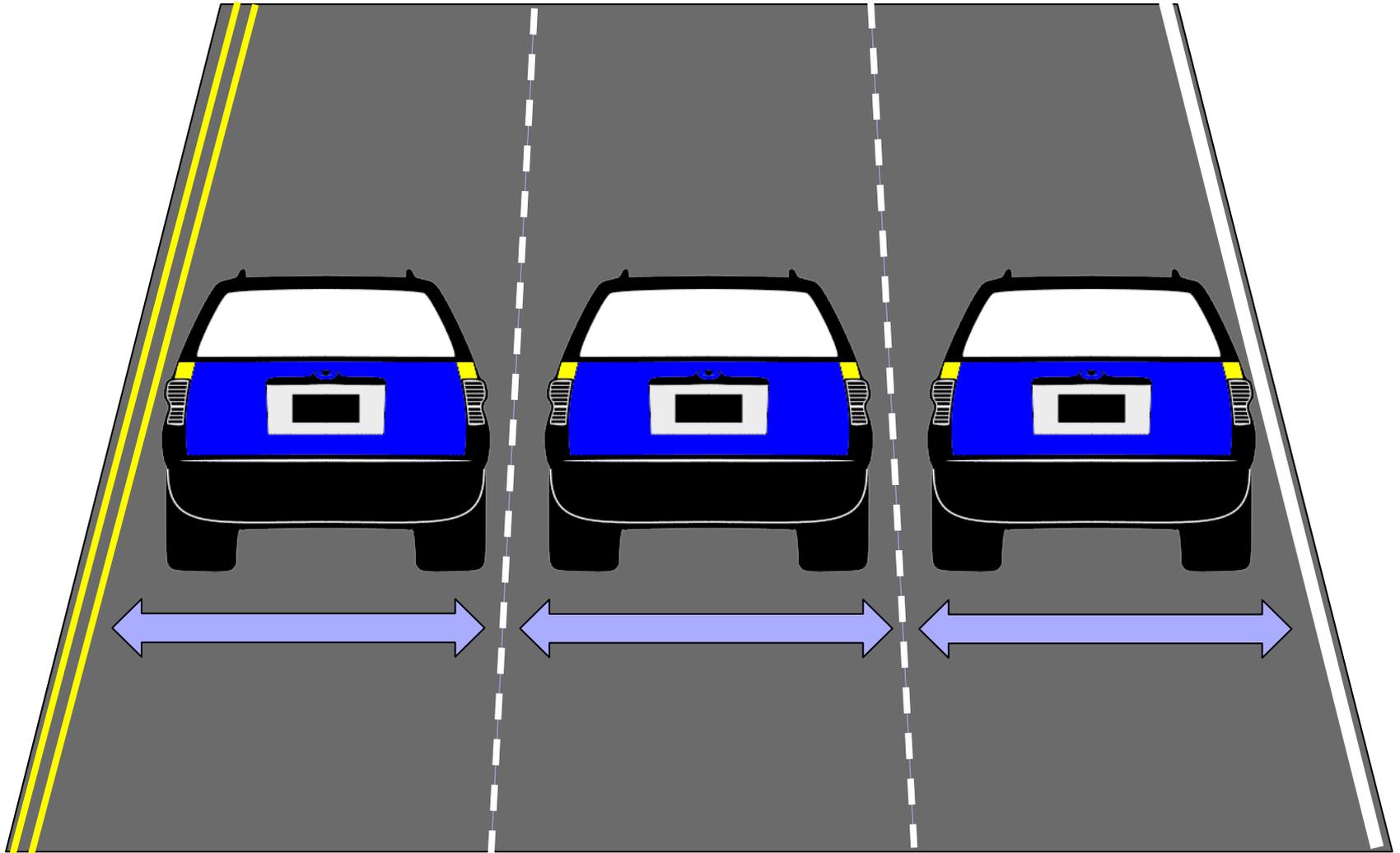
Keeping the Bridge to the Next Node Intact



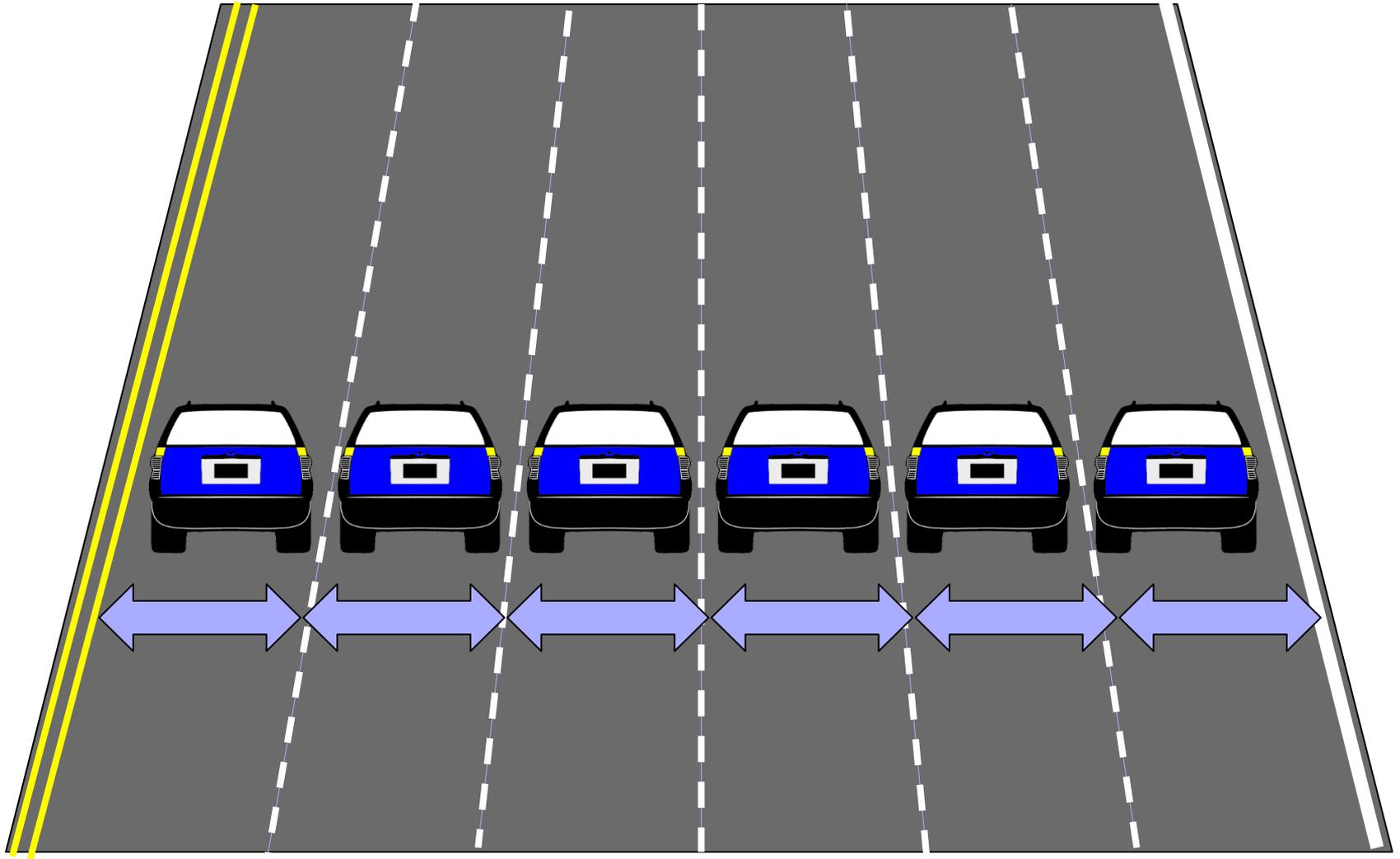
The Bridge Is Intact; Is the Toll Too High?



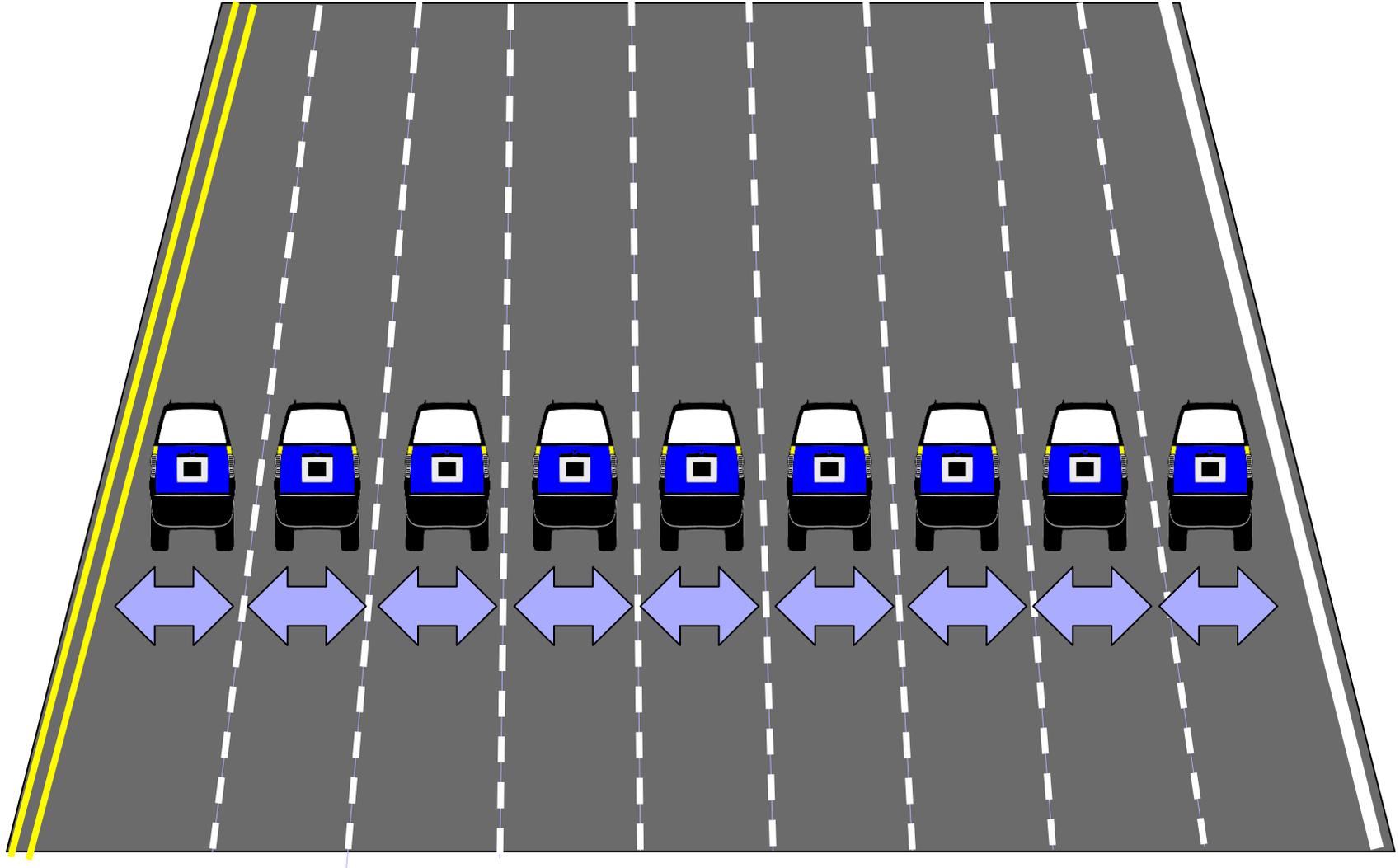
Moore's Law: Benefits are Worth the Toll



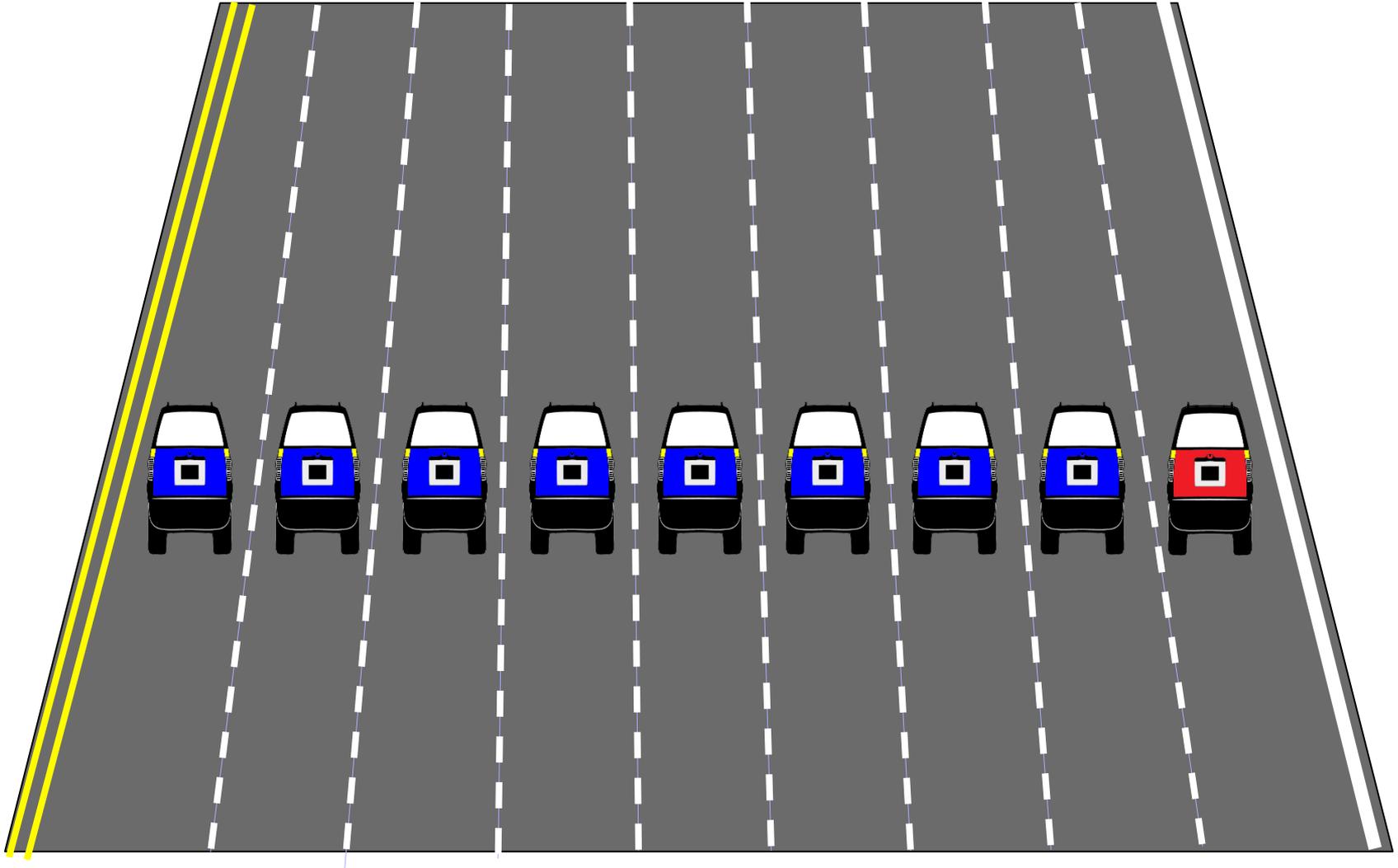
Density Used to Double Every Node



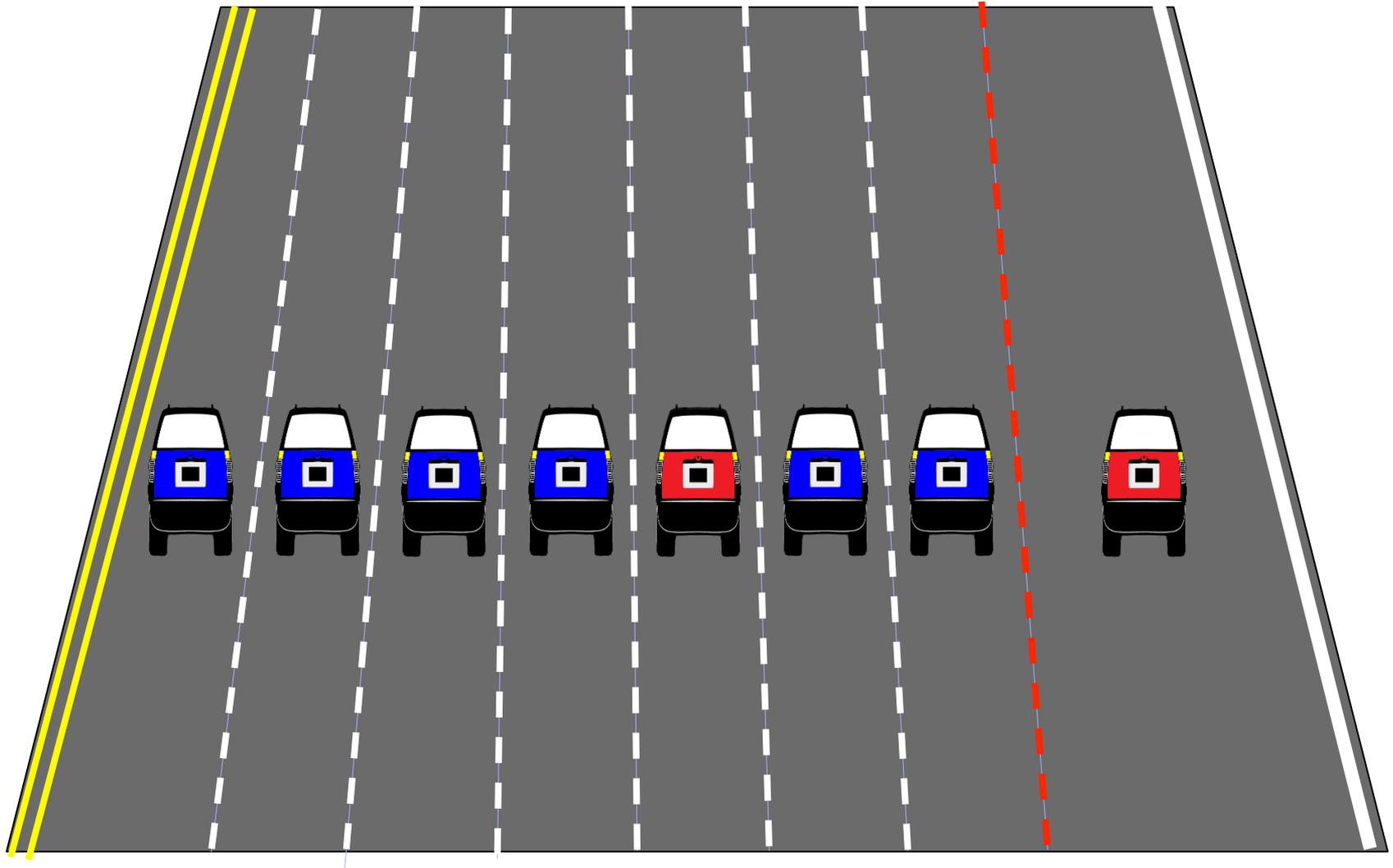
Density No Longer Scales



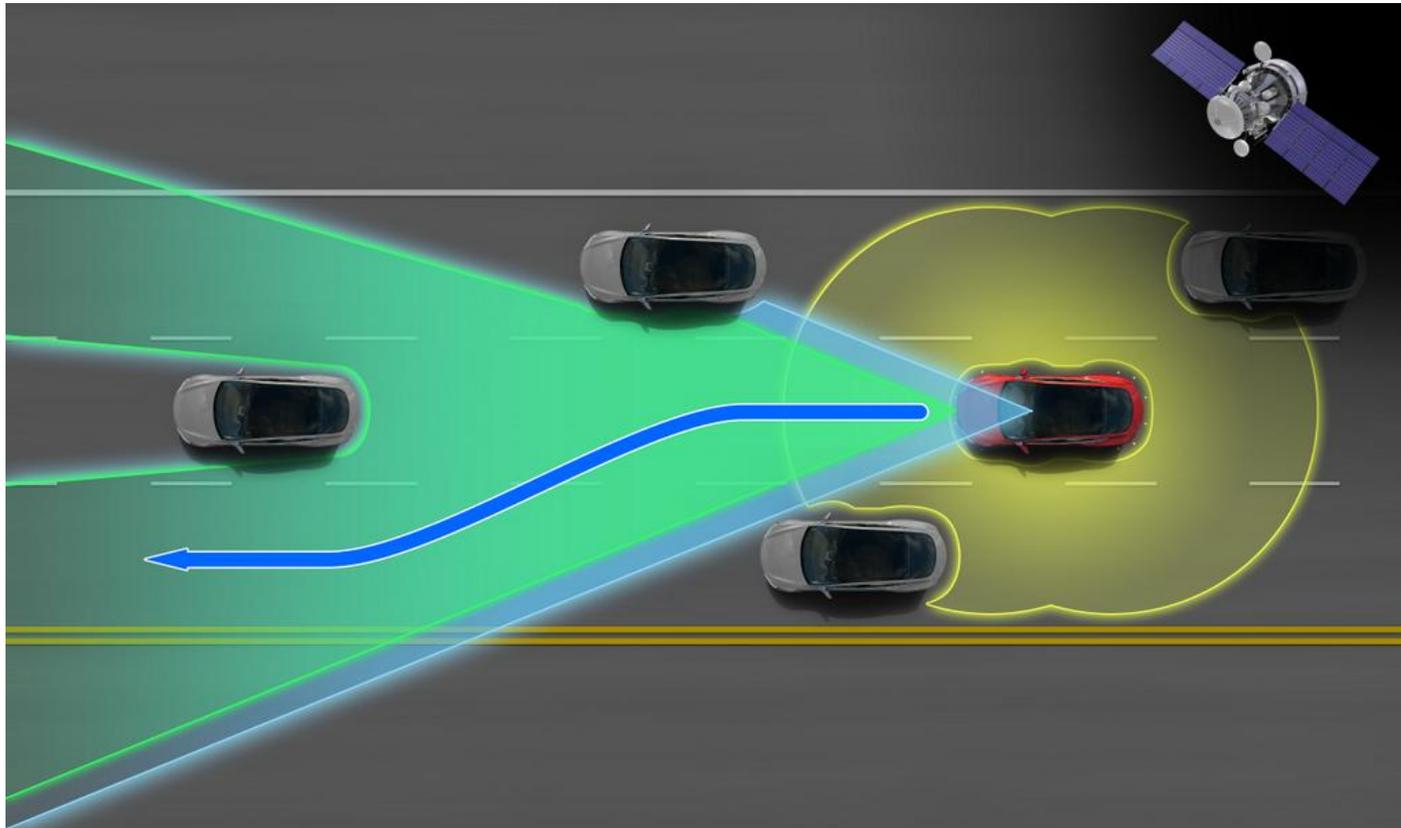
Worst-Case Rules Constrain Density



Design Rules Reach the Breaking Point

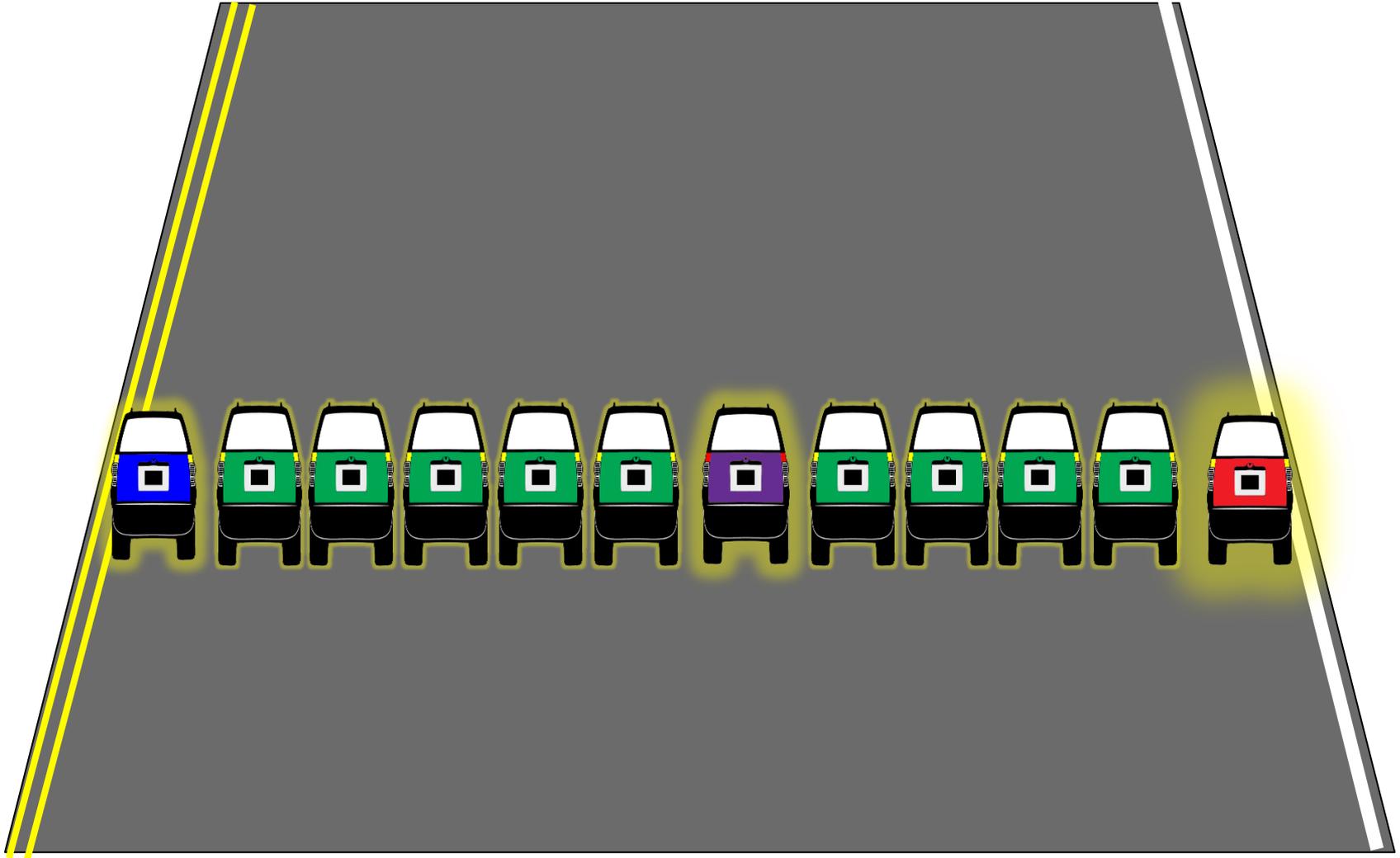


Simulation Is the Answer



Source: Tesla via orzzz.com

Simulation Reactivates the Density Benefits of Moore's Law



Use Simulation to Reactivate Density Benefits

- **Even 10,000 rules can't express every case**
 - Conservative rules erode the benefits of Moore's Law
- **Simulation-based processing enables context-dependency**
- **Leads to no rectilinear constraint on mask shapes**
- **Enables ILT programs the freedom to improve lithography**

**Use the power of computation provided by Moore's Law
to reactivate the density benefits of Moore's Law**