Tera-Pixel APS for CALICE

Progress meeting, 12th July 2006

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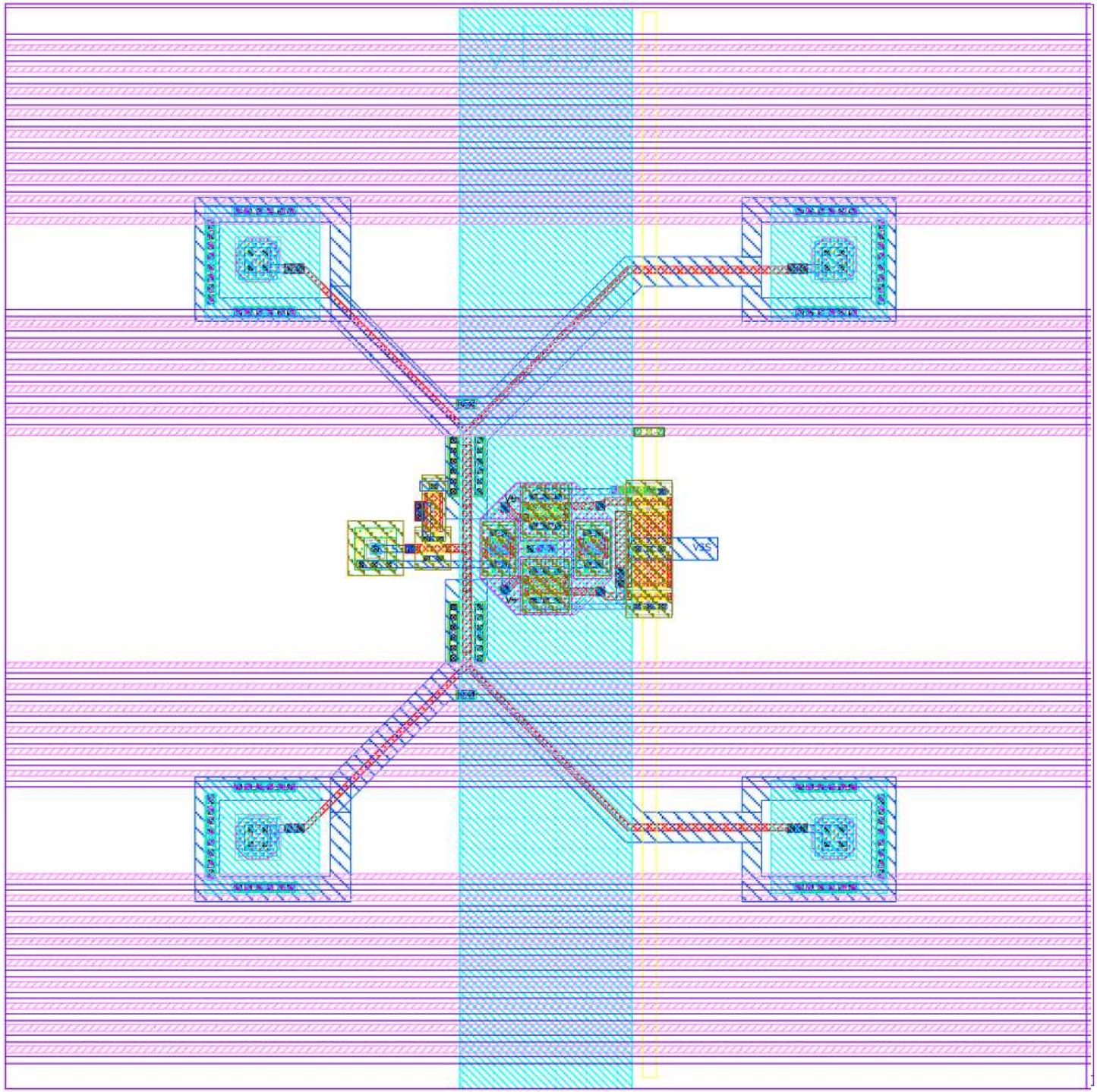
Phone meeting with Foundry (June 19th)

- **Foundry Actions:**
- Check the possibility of performing process splits in Shuttle run *à Yes this is possible*
- Check the availability of the corner model for Deep N-well Diode - dnwell33 *à No model avail.*
- Check the availability of the GDS files of the following IO pad libraries:
  - staggered analog pads
  - PCI inline pads
- Check if Foundry offers large IO pads (100um x 100um) both for Analog and Digital
- Send Rutherford the shuttle schedule for the beginning of 2007

pending

- **Rutherford Actions:**
- Send Foundry a draft of Calice project *à Sent example pixel GDS*
- Send Foundry Rutherford's requirements for TCAD tool both for MI3 and Calice projects. *à Sent summary document (details from Guilio)*
- Fill out and send Foundry the CIS Application General Questionnaire for Calice project (see attached)

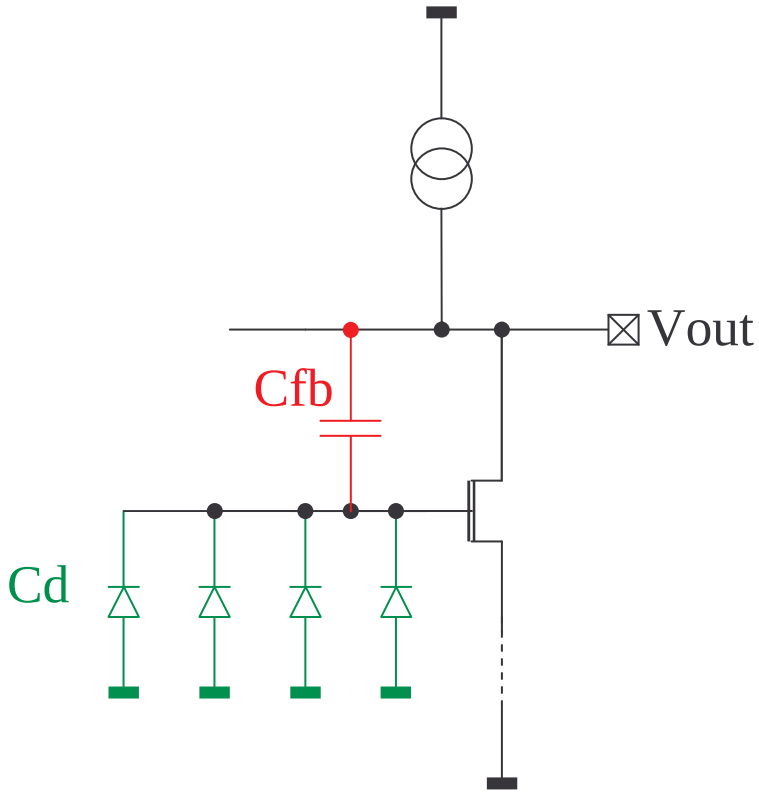


Demo Pixel

Analog Pixel

- Voltage amplifiers disappointing
- Charge amplifiers may be more appropriate
- Autozero comparator may be too complex
  - Clock line switching in every pixel
- Simpler comparator design possible if we can reset the pixel after a hit?

Charge Amplifier



K Smaller Cfb à Larger output step

J Charge-to-voltage gain is independent of Cd (hence can have 4 diodes in parallel)

J Larger voltage step at output than seen before

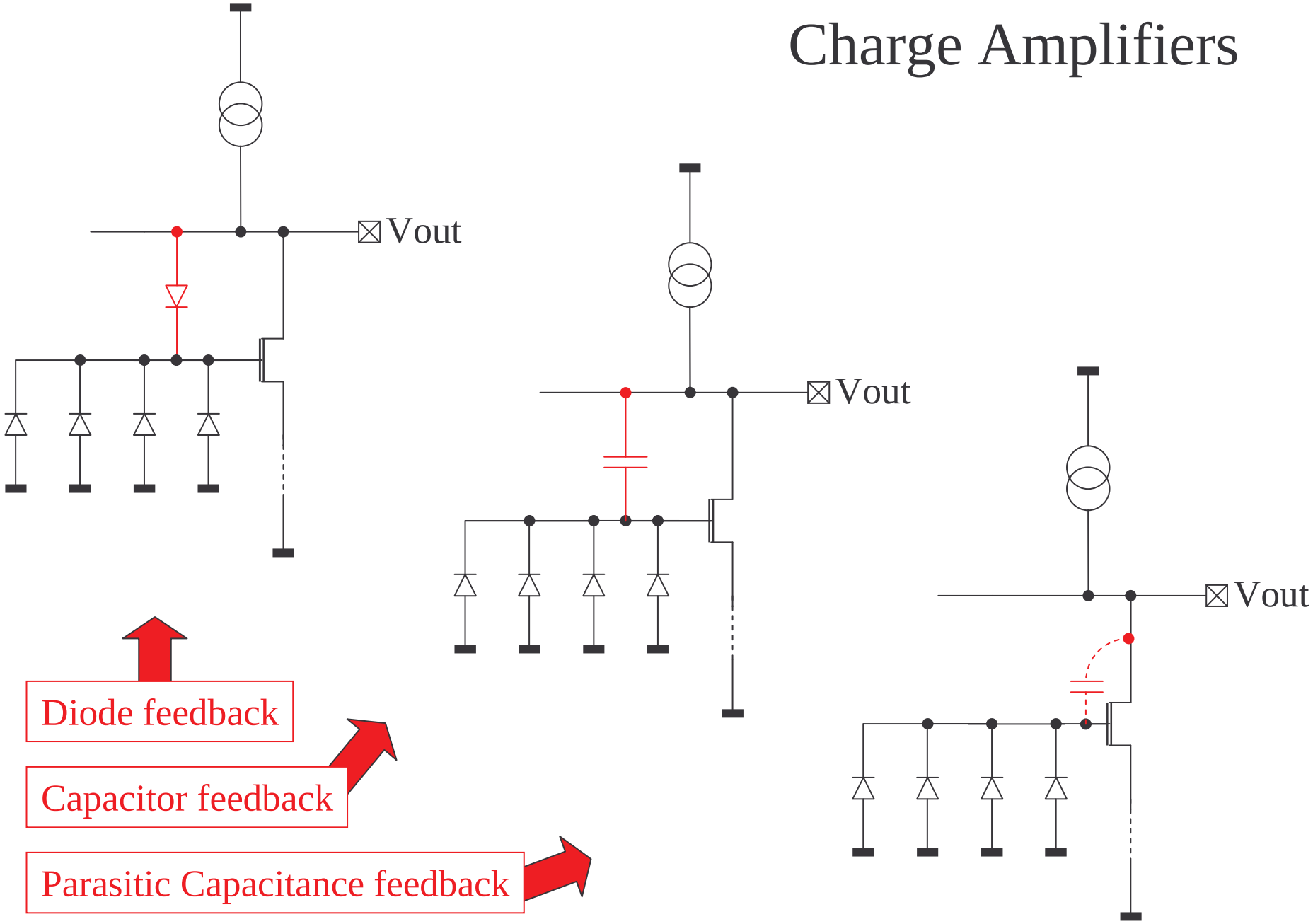
L Purely capacitive feedback requires a reset phase

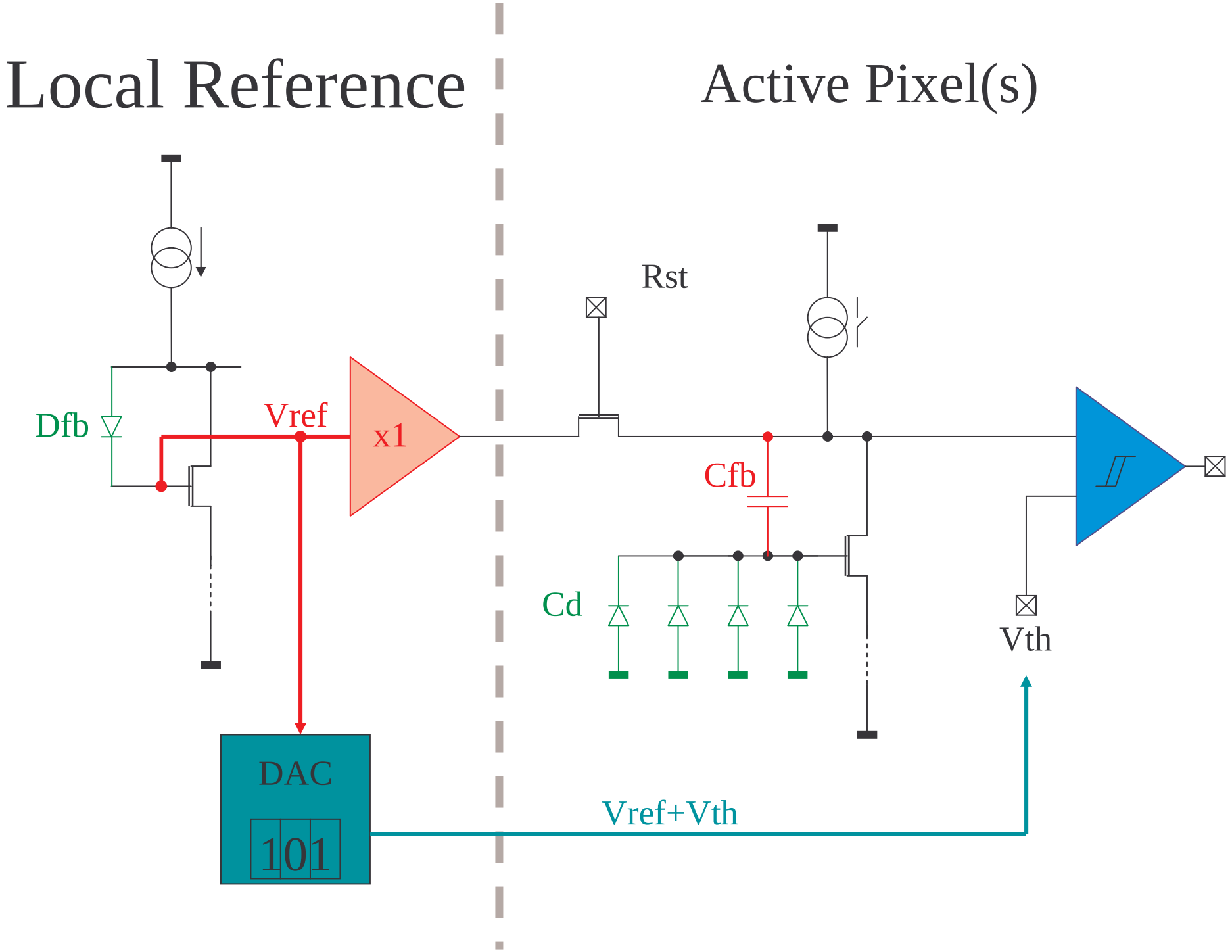
K Diode feedback provides resistive 'biasing' feedback

L No corner of MonteCarlo models for diode

L Parasitic feedback subject to layout and accuracy of 3D parasitic extraction tools!

Charge Amplifiers




Local Reference
Active Pixel(s)
Rst
Dfb
Vref
x1
Cfb
Cd
Vth
DAC
101
Vref+Vth

		Diode feedback			MIM-cap feedback			Parasitic-cap feedback			
Number of pmos		1			1			1			
Vdd		2.5			2.5			2.5			
Static current		500nA			500nA			500nA			
Process Corners		**Slow**	**Typ**	**Fast**	**Slow**	**Typ**	**Fast**	**Slow**	**Typ**	**Fast**	
Vout step (450e-)	4diode	49.0	45.1	39.5	15.4	14.4	14.5	59.7	55.7	51.2	
Voltage Gain											
DC diode voltage											
DC output voltage											
Final value (DC o/p)											
Noise