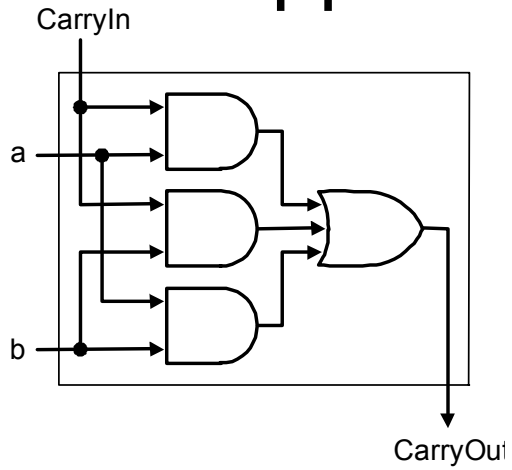
Chapter 3

Arithmetic for Computers

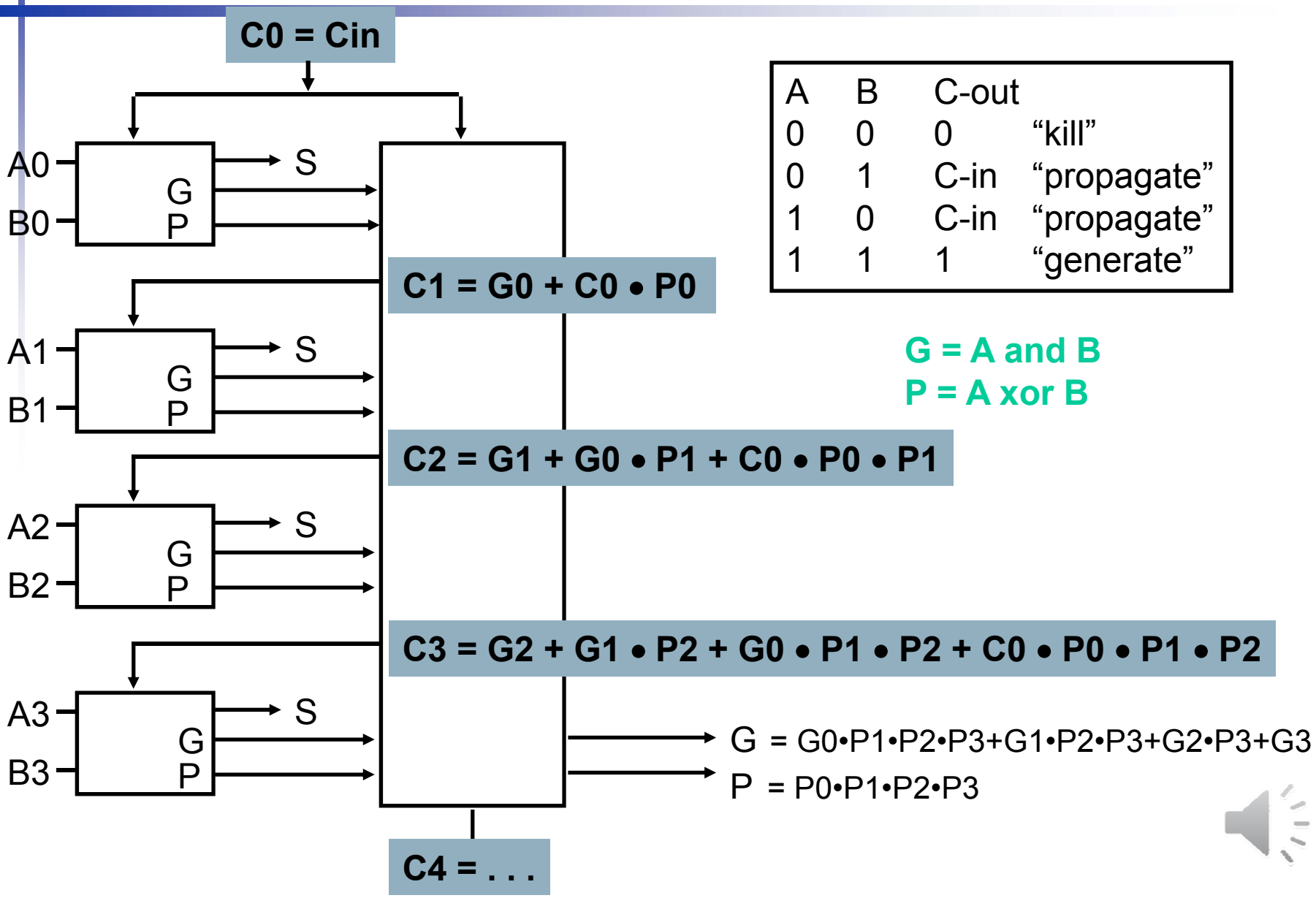
Can We Make a Faster Adder?

- Worst case delay for N-bit Ripple Carry Adder
  - 2N gate delays
  - 2 gates per CarryOut
  - N CarryOuts



- We will explore the Carry Lookahead Adder
  - Generate - Bit i creates new Carry
    - $g_i = A_i \& B_i$

Carry Look Ahead

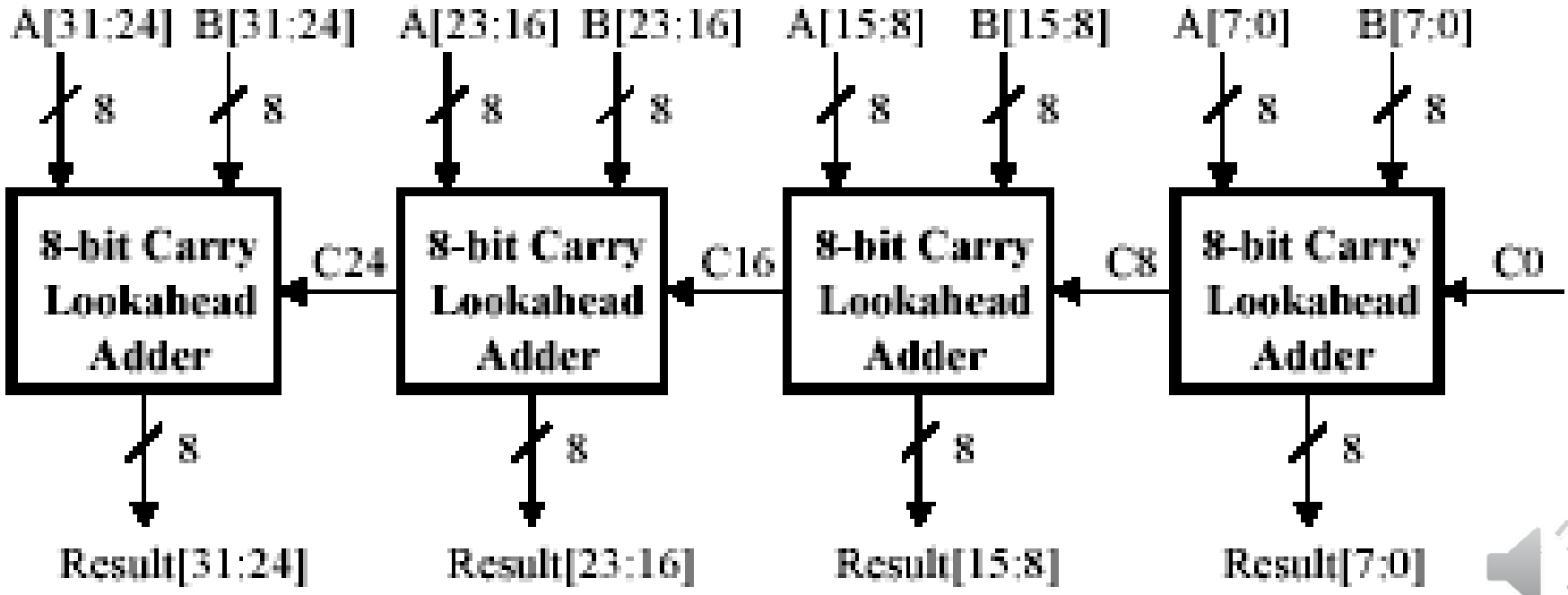


A	B	C-out	
0	0	0	“kill”
0	1	C-in	“propagate”
1	0	C-in	“propagate”
1	1	1	“generate”

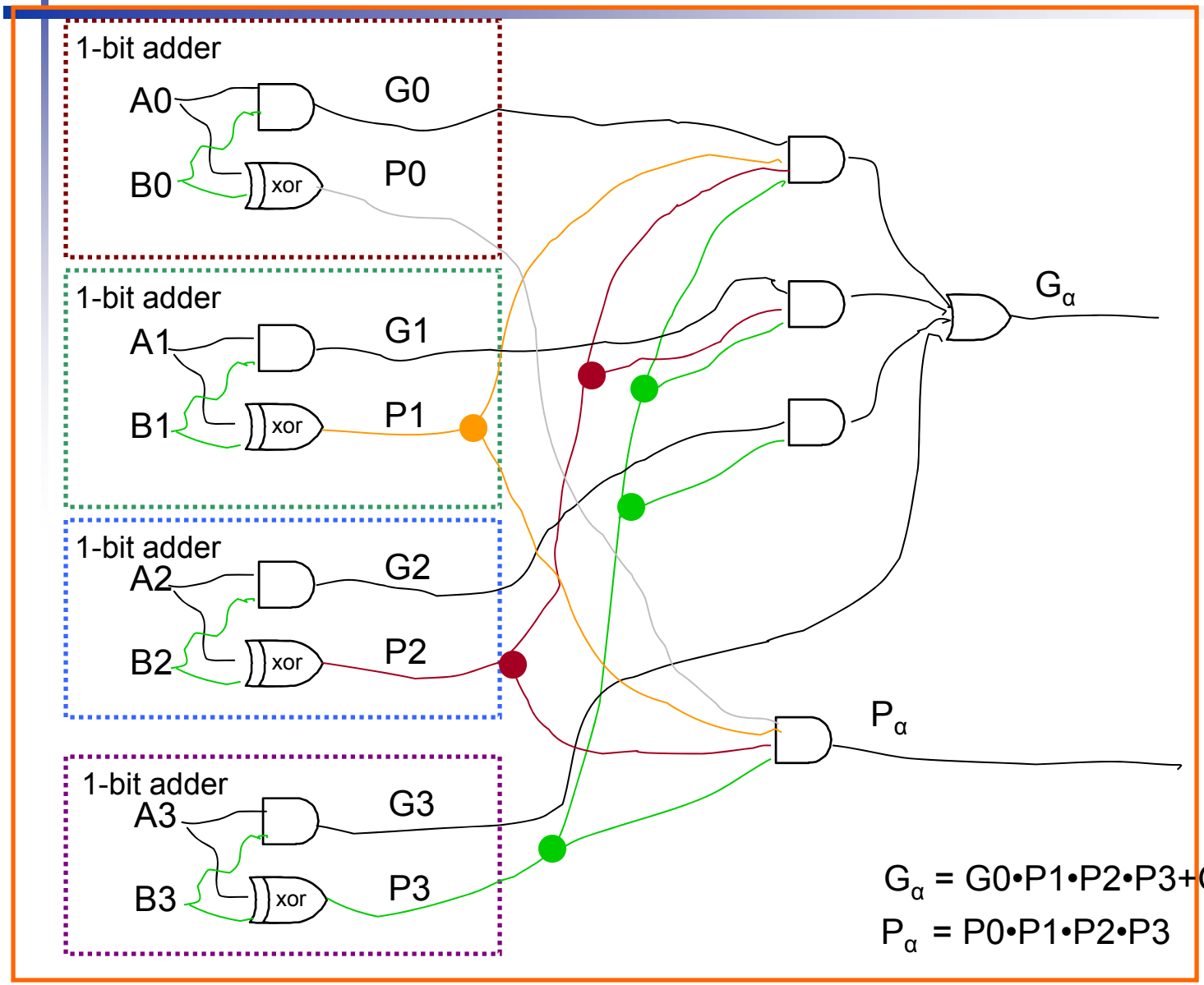
G = A and B
P = A xor B

Partial Carry Lookahead Adder

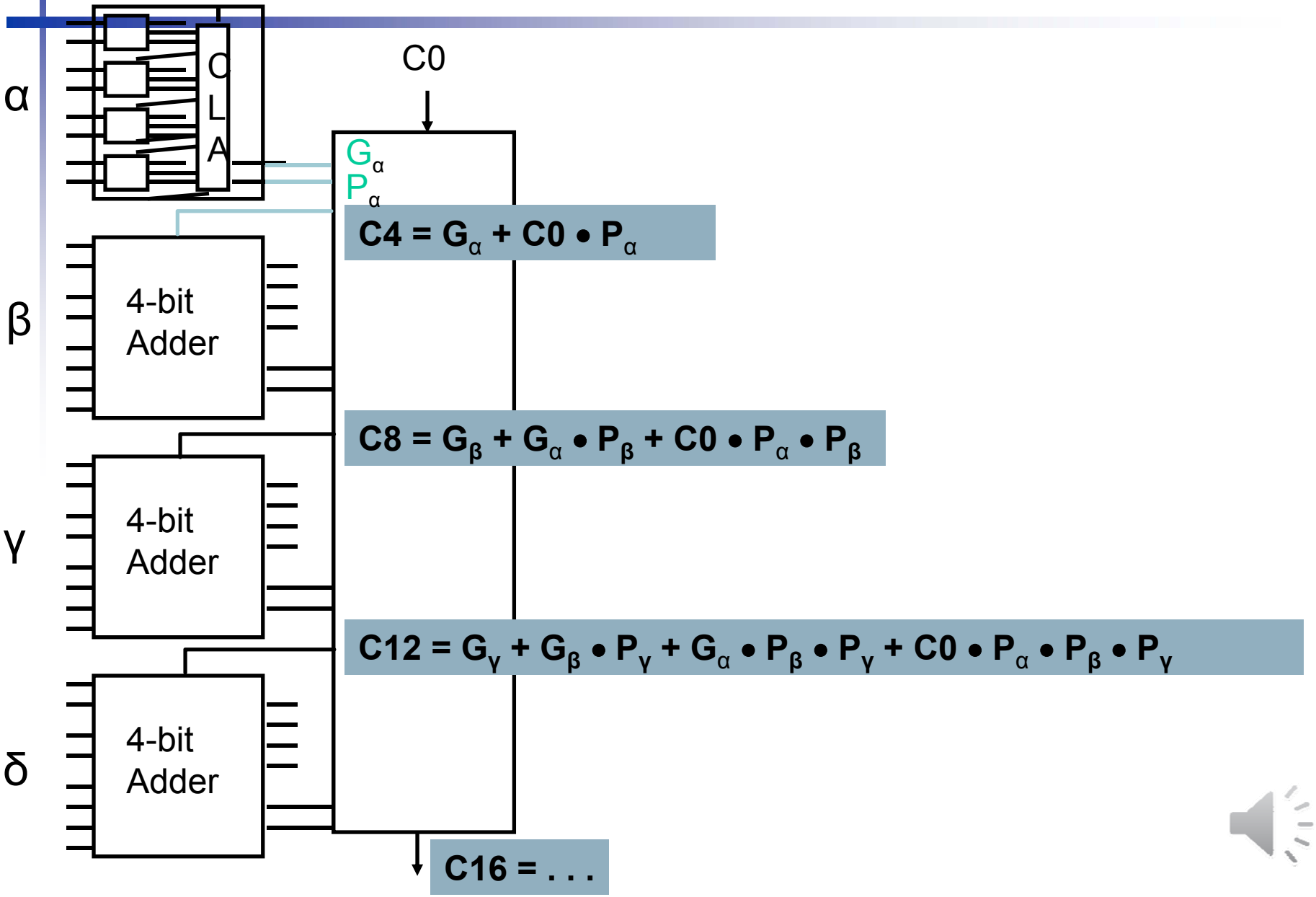
- Connect several N-bit Lookahead Adders together
- Four 8-bit carry lookahead adders can form a 32-bit partial carry lookahead adder



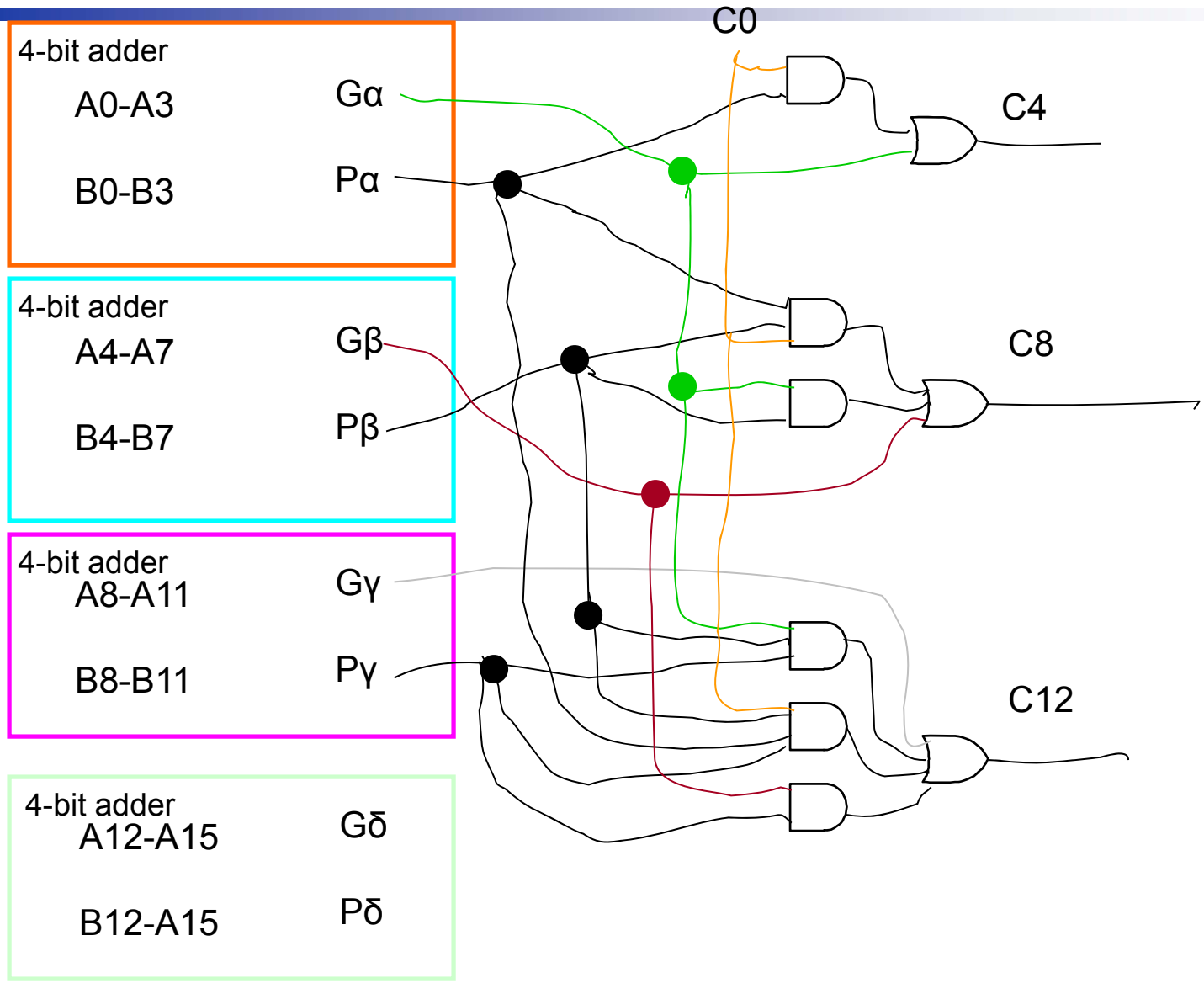
Generate and Propagate



Hierarchical CLA



Generate and Propagate



Carry Select Adder