The Boomerang Attack

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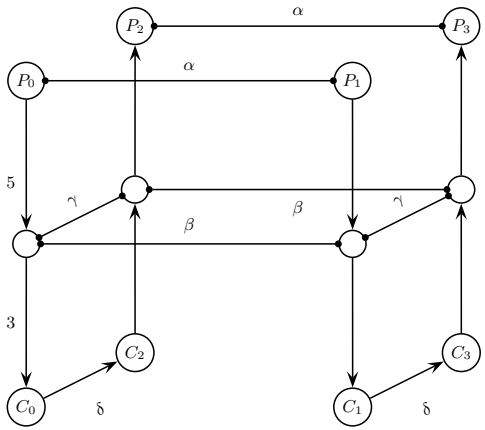
What is the Boomerang Attack

- An extension of differential cryptanalysis.
- Invented by David Wagner, and published in 1999.

How Does it Work - in a Nutshell

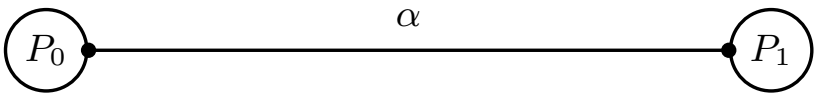
- Instead of using one long differential that covers the full cipher, we use two shorter differentials of each covering part of the cipher.
- We append the two differentials to build a boomarng that covers the full cipher.



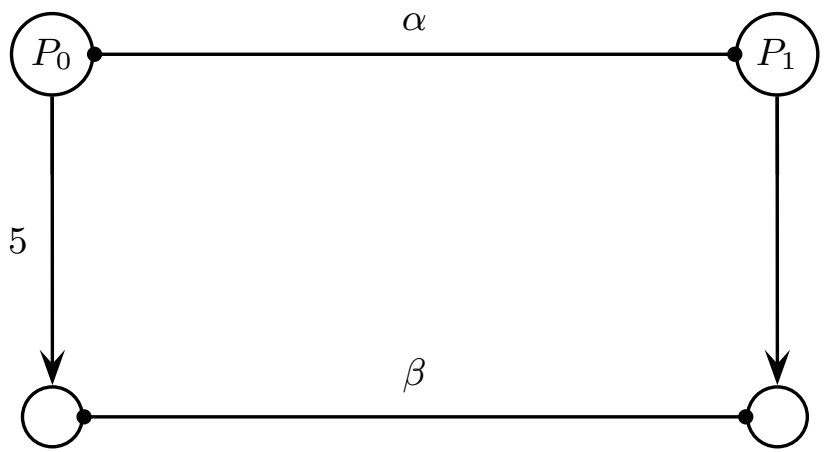
Why don't we Always Use it?

- The attack model is different.
- The complexity

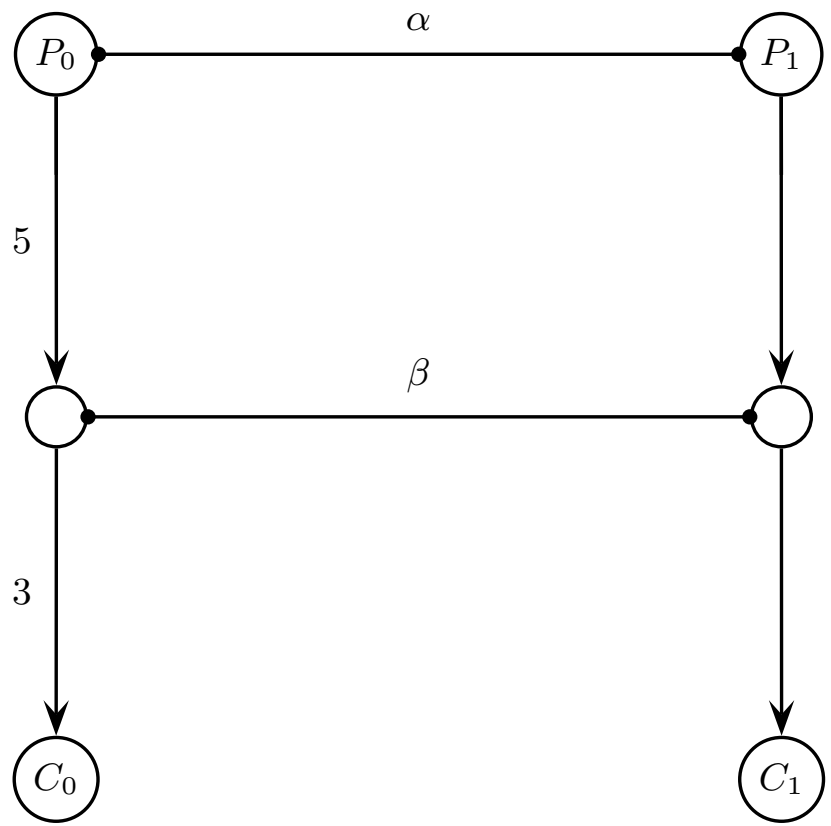
A Step-by-step Construction



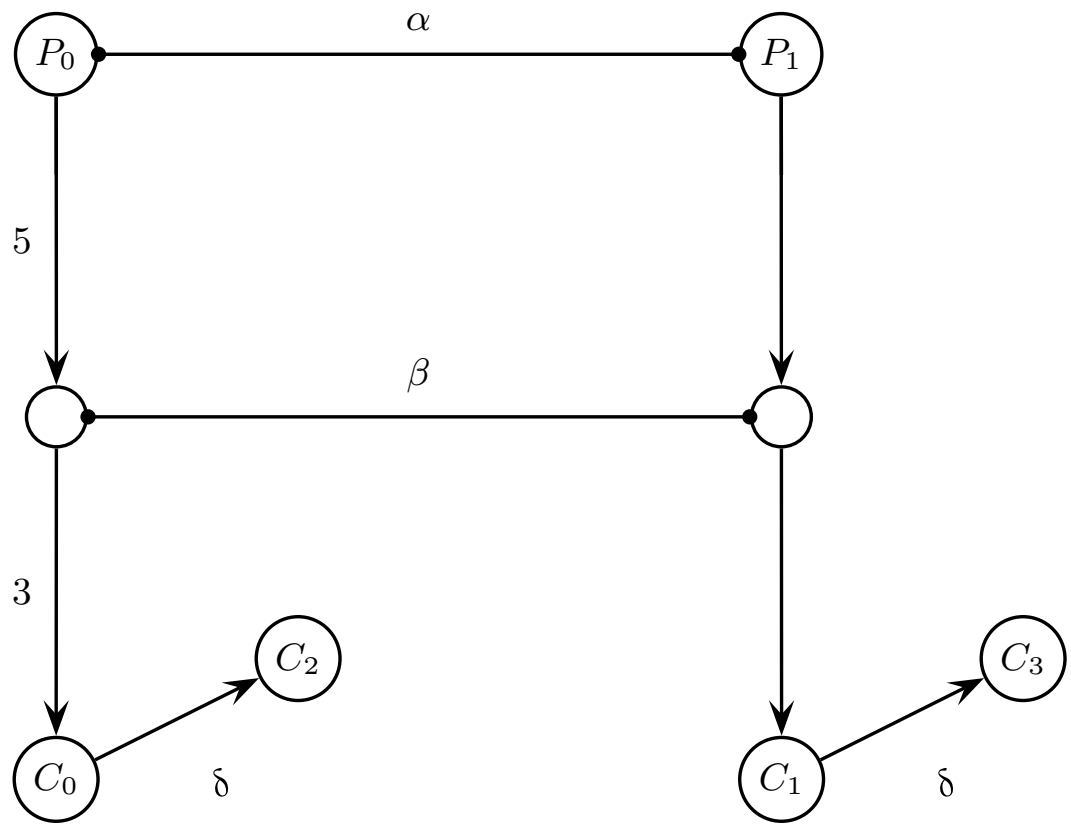
A Step-by-step Construction - Cont.



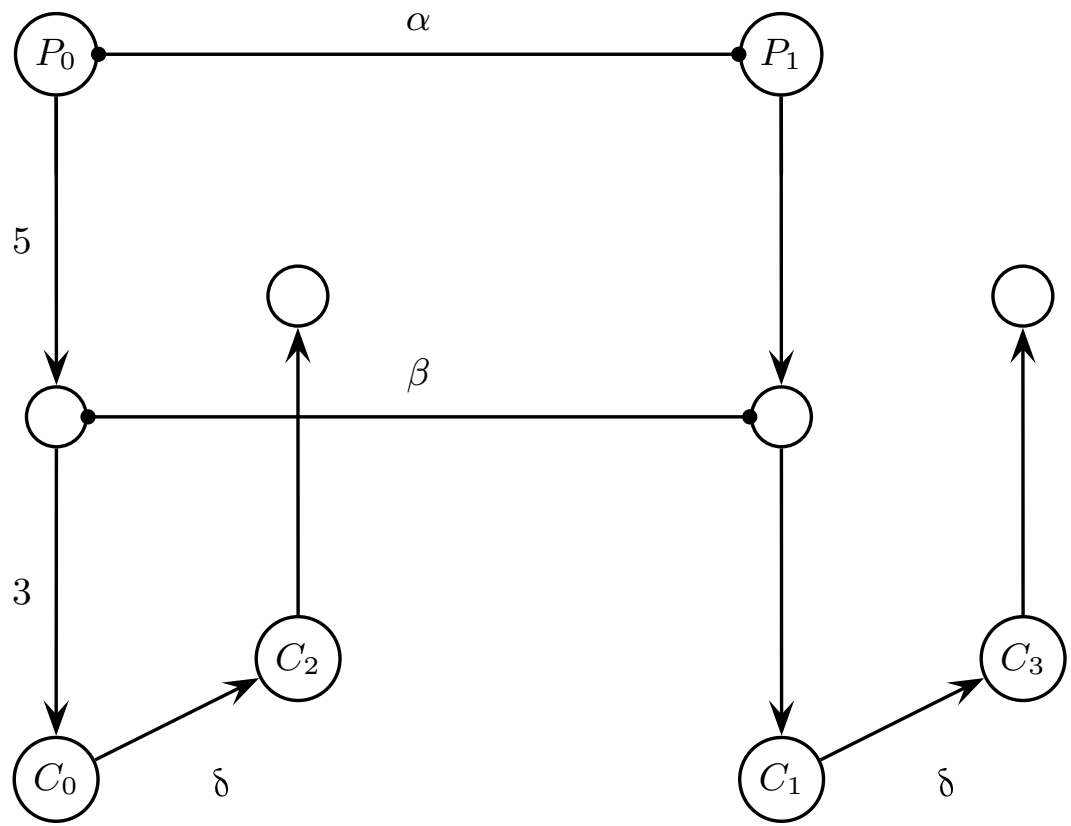
A Step-by-step Construction - Cont.



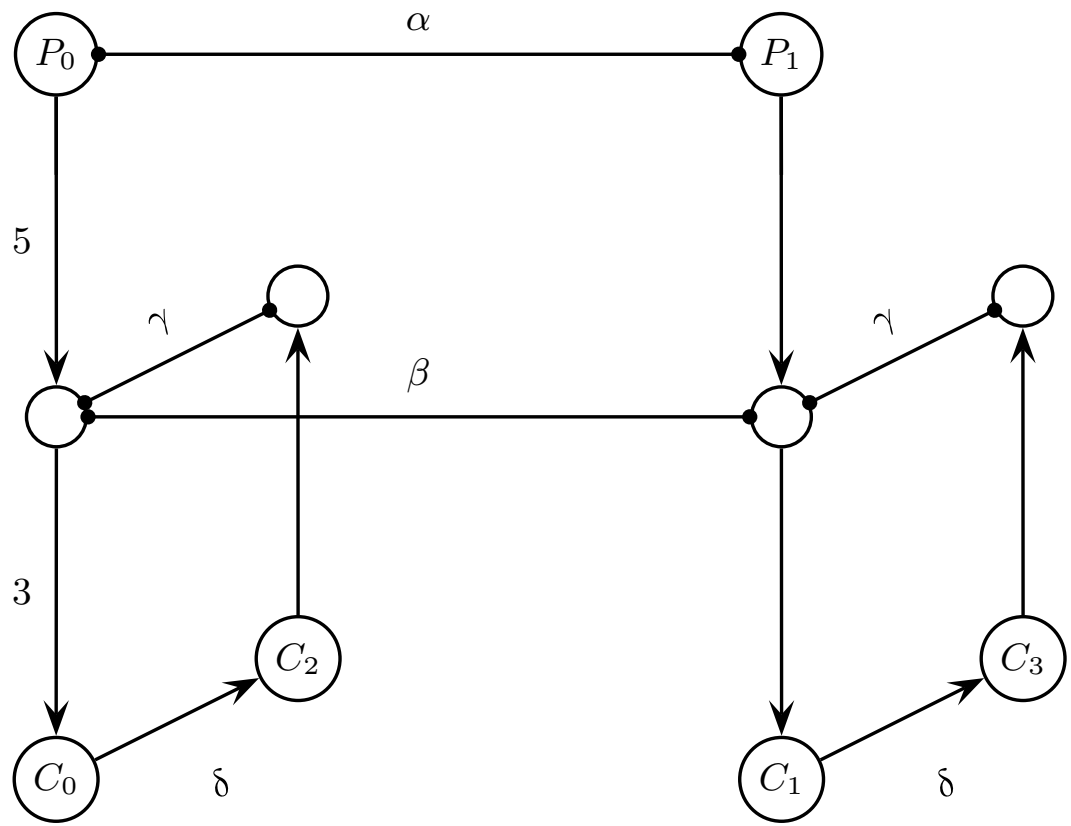
A Step-by-step Construction - Cont.



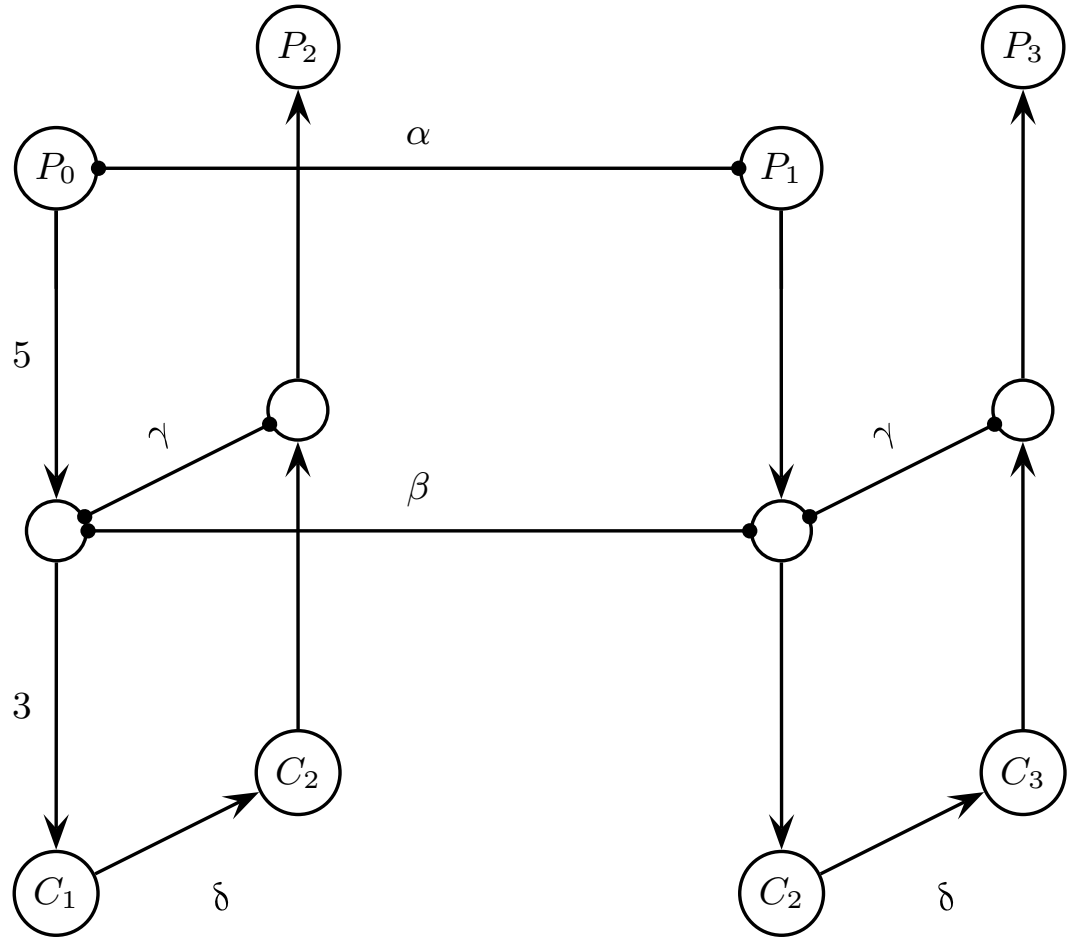
A Step-by-step Construction - Cont.



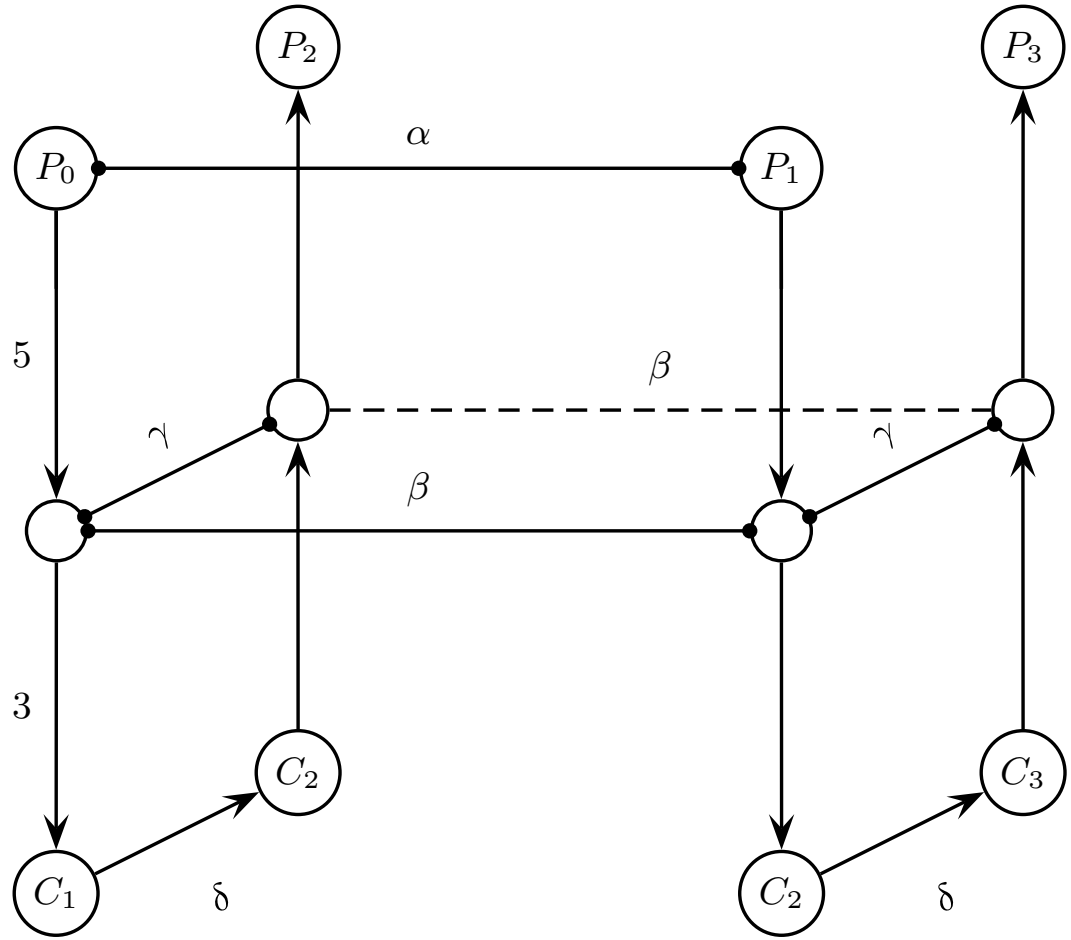
A Step-by-step Construction - Cont.



A Step-by-step Construction - Cont.



A Step-by-step Construction - Cont.



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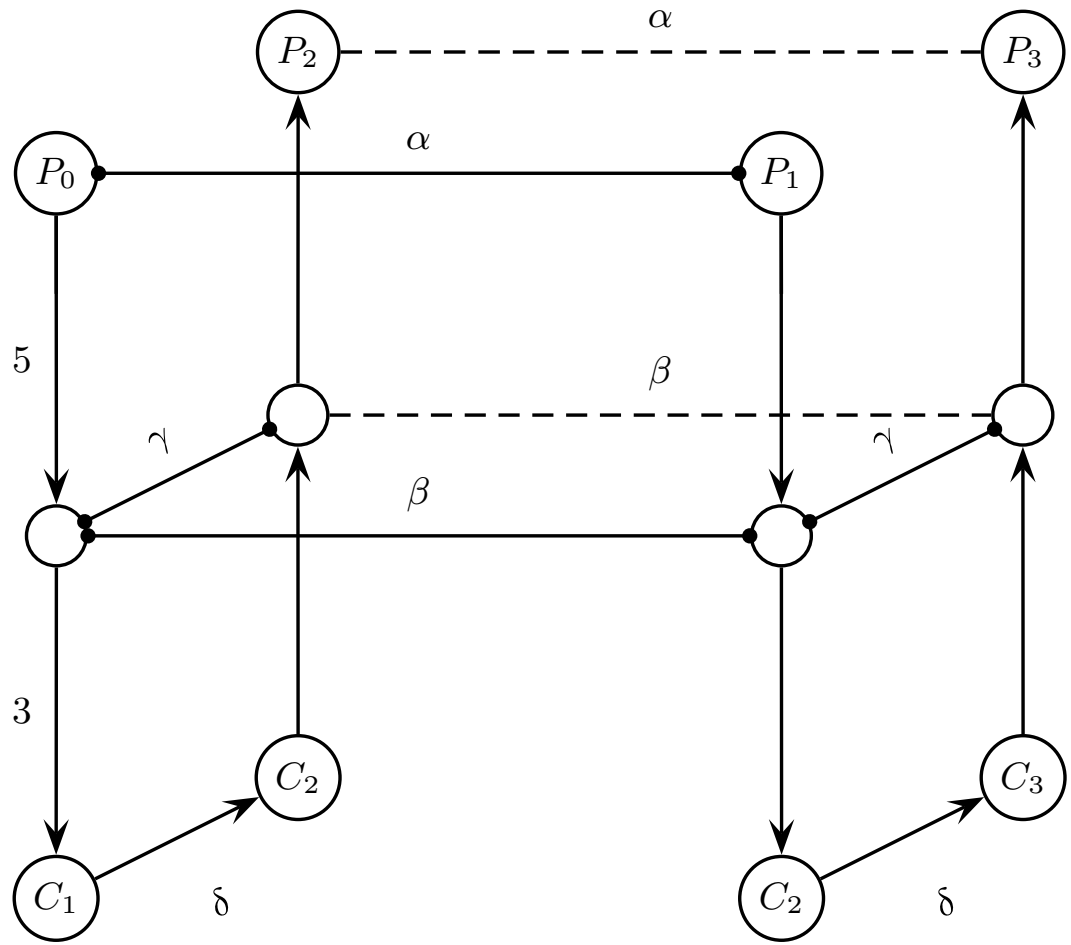

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- So...
- $(p \cdot q)^2$

What is it Good For?

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- $k_0 \in \{000001, 010001, 100001, 110001, 101111, 011111\}$

The Inside-out Attack

- Use truncated differentials.
- Use the birthday paradox to make the differentials collide, having the reqiured difference.

*R-attacks

Related-key Differentials

Questions