Design a block cipher

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- Round function
- Key schedule

“strong” key schedule

“weak” key schedule

Related-Key Attacks

$E_{K_i}(P_i)$, $K_i = \Phi_i(K)$

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Avoid by choosing keys at random

Multi-Key Attacks

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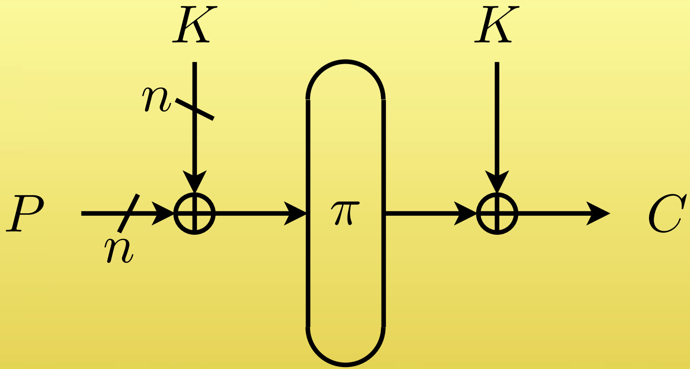
$$E_{K_1}(P), E_{K_2}(P), \ldots, E_{K_D}(P)$$

Always leads to security erosion!

Simplest Fully-Secure Cipher

Even-Mansour



Multi-key Even-Mansour: $(D^2 + 2DT)/2^n$

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Ideal block cipher: same bound if $D = \ell$

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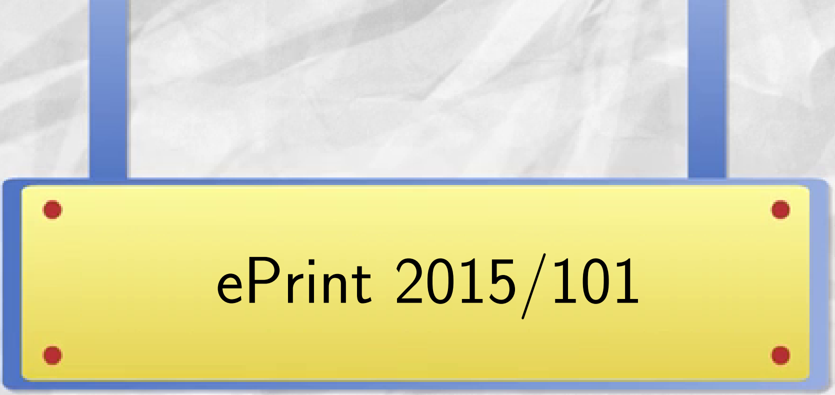

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