OSY.SSI[2015][4]

Notions of cryptography

This is not a Crypto course.

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Okay maybe just a little

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Cryptography

A definition

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Nevertheless, it's interesting so let's talk about it.


SHUT
OPEN

Cryptography

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Note: if $\mathbf{P} = \mathbf{NP}$, then hard problems don't exist.

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The framework

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Example:

$$\underbrace{\texttt{DotA2}}_{\text{Game}} - \underbrace{\texttt{Polard}}_{\text{Adversary}}$$

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Shannon's game: IND-ONETIME

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The *advantage* is the probability that Bob wins the game:

$$\mathcal{A}^{\mathrm{IND}} = \left| \Pr\left[\text{Bob wins}\right] - \frac{1}{2} \right|$$

We want this to be as small as possible.

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Shannon's game: IND-ONETIME

$$
\begin{aligned}
m_0 &= 42 \\
m_1 &= 69 \\
X &= 1328111406936738814233136598523649120591057076609366993787434974992249717152208863269860655190296374487681635030289115548853940474812667441442229218578540925220642653758876912554424018330886760662928726528056192926786208742650591040002226597309870518868043425184899501098511877398934999057859295516670925844 29
\end{aligned}
$$

Which one is it?

Cryptography

Kerchoff's principle – Security by design

(Auguste Kerckhoffs, *La Cryptographie Militaire*, 1883.)

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i.e. there is no "security through obscurity".

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Question: What is the security level of RSA ?

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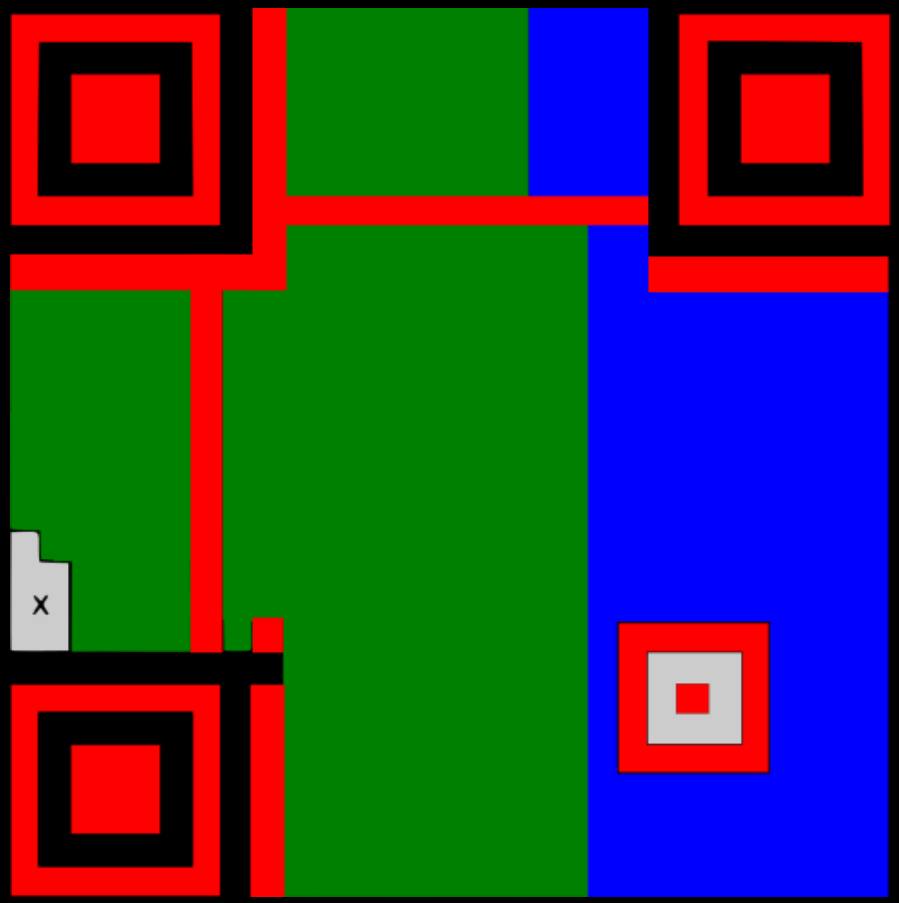
The whole branch of “error correcting codes” deals with $\perp$.

What do we do with cryptography?

Error correcting codes



Anatomy of a QR Code v3 level H.

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Encrypt-then-MAC.

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"Diffie-Hellman key-exchange" (CDH, DDH).

About those keys

ECDHE_RSA stands for Elliptic Curve Diffie-Hellman key-exchange, signed with RSA.

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Just don't use ECB, CBC, CFB, OFB modes! (and avoid CTR if you can)

Two key issues with cryptography

For our purposes

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Hint:

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- No crypto...

... next week: The Internet part I