Capacity of Multi-antenna Gaussian Channels (I. E. Telatar, 1999)

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Overview

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Notation for sets, scalars and vectors

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- $[i : 2^a] = \{i, i + 1, ..., 2^{\lceil a \rceil}\}$, where $\lceil a \rceil$ is the smallest integer $\geq a$.

Notation for probability and random variables I

- The probability of an event $\mathcal{A}$ is $\mathsf{P}(\mathcal{A})$ and the conditional probability of $\mathcal{A}$ given $\mathcal{B}$ is $\mathsf{P}(\mathcal{A}|\mathcal{B})$.

Notation for probability and random variables II

- $X^n \sim p(x^n)$ means that $p(x^n)$ is the probability mass function (pmf) of the discrete random vector X^n.
- $X^n \sim f(x^n)$ means that $f(x^n)$ is the probability density function (pdf) of the continuous random vector X^n.
- $(X^n, Y^n) \sim p(x^n, y^n)$ means that $p(x^n, y^n)$ is the joint pmf of X^n and Y^n.
- Given a random variable X, the expected value of a function $g(X)$ is denoted by $\mathsf{E}_X(g(X))$ or simply $\mathsf{E}(g(X))$.

Notation for probability and random variables (and III)

- $X \sim \text{Bern}(p)$ means X is a Bernoulli random variable with parameter $p \in [0, 1]$, i.e., $X = 1$ with probability p and $X = 0$ with probability $1 - p$.
- $X \sim \text{Unif}(\mathcal{A})$ means X is a discrete uniform random variable over the set $\mathcal{A}$.
- $X \sim \text{Unif}[i : j]$ for integers $j > i$ means X is a discrete uniform random variable over $[i : j]$.
- $X \sim \text{Unif}[a, b]$ for $b > a$ means X is a continuous uniform random variable over $[a, b]$.
- $X \sim \text{N}(\mu, \sigma^2)$ means X is a Gaussian random variable with mean μ and variance σ^2.

Common functions

- The function $\log p$ is assumed to be the base 2 logarithm function of p.
- The binary entropy function: $H(p) = -p \log p - \bar{p} \log \bar{p}$ for $p \in [0, 1]$.
- The Gaussian capacity: $\mathcal{C}(x) = \frac{1}{2} \log(1 + x)$, for $x \geq 0$.
- $[x]^+ = \max\{x, 0\}$.

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- Text visible on slides 3

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- Text visible on slide 4

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Sample frame title

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Remark

Sample text

Important theorem

Sample text in red box

Examples

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Two-column slide

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$$E = mc^2$$

- First item
- Second item

This text will be in the second column and on a second thought this is a nice looking layout in some cases.

References

E. Telatar, "Capacity of multi-antenna gaussian channels," *European Transactions on Telecommunications*, vol. 10, no. 6, pp. 585–595, 1999.