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1. The acronym WCDMA stands for
2. Multipath Propagation of the wireless channel leads to
3. The process by which the channel coefficient is constantly changing is termed as _____ and it arises due to _____
4. The probability density function of an exponential random variable X with mean 2 is
5. Which of the following is NOT a 3G Wireless Standard
6. The distribution of the phase of the Rayleigh fading channel coefficient is
7. The probability that the attenuation of the Rayleigh fading channel is worse than $25\ dB$ is
8. Consider a simple multipath propagation scenario with $a_0 = a_1 = \sqrt{2}$ and $a_2 = 2$. Let the delays $\tau_0 = \frac{3}{4f_c}, \tau_1 = \frac{5}{4f_c}, \tau_2 = \frac{9}{8f_c}$. The net amplitude of the channel coefficient h is
9. The real and imaginary parts of a standard wireless channel coefficient are assumed to be distributed as
10. What is the approximate dB SNR required to achieve BER of 8×10^{-9} in the AWGN channel $y = 2x + n$, where x denotes the transmitted symbol and n denotes the additive white Gaussian noise.

Answer:

1. Wideband Code division of Multiple Access
2. Superposition of multiple signals
3. Fading Process and arises due to multipath wireless communication environment.
4. let pdf be $\lambda e^{-\lambda x}$.

   Now, $\int_0^\infty x\lambda\, e^{-\lambda x} = 2.\ i.e \frac{1}{\lambda} = 2 \rightarrow \lambda = 0.5$

   So, pdf will be $0.5\ e^{-0.5x}$.

5. Options not mentioned here!

6. $1/2\pi$

7. let's amplitude is a, then

   $$10\log_{10} a^2 < -25 \rightarrow a < \sqrt{10^{-2.5}} which\ is\ a <\ 0.0562$$

   $$i.e$$

   $$\int_0^{0.0562} 2ae^{-a^2} da = 1 - e^{-0.003} = 0.9665$$

8. we know,

   $$h = \sum_{i=0}^{L-1} a_i e^{-2\pi F_c \tau_i}$$

   after plugging out values we get,

   $h = \sqrt{2} * e^{-\frac{3\pi}{2}} + \sqrt{2} * e^{-\frac{5\pi}{2}} + 2 * e^{-\frac{9\pi}{4}}$ which implies $|h| = 2$

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9. Gaussian distribution

10. we have,

$$P_e = Q\left(2\sqrt{\frac{P}{\sigma^2}}\right) = Q\left(2 * \sqrt{SNR}\right) = \int_{\sqrt{4SNR}}^{\infty} \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}} = 8 \times 10^{-9}.$$

$$\sqrt{4SNR} = 5.6505 \rightarrow SNR = 31.9279 = 15.0417\ db$$