College of Electronic and Technology - Baniwalid
Department of Communication Engineering
Final Exam: Spring 2016   7th Semesters
Subject: Wireless Communication System   Examiner: Dr. Masoud Eddeghel
Date: 2nd of June 2016   Examination time: 180 Minutes

Q1/ [12 marks]

a] Is it possible to increase the receives SNR in wireless communication systems without increasing the transmitted power? [Yes - No]

b) If the previous answer yes. Explain how?

c) Nominate two practical wireless systems.

d) What are their standard?

Q2/ [9 marks]

a) What are the three major kinds degredation cause by wireless channel?

b) What are the physical factors influence the fading in wireless channel?

c) How to aschive diversity gain?

$$D_g = D_m + D_f$$

Q3/ [3 marks]

a) Defined the Alamouti space time block coding (STBC)

Q4/ [15 marks] A MISO system contains of two transmit antennas and one receive antenna.

a)- Draw the block diagram of this system.

b) Draw the schematic diagram of this system.

c) Derive the mathematical equations to find estimated received signal.

d) What is the diversity gain of this system?

e) If the SNR = 20 dB, find the normalized capacity (C/W) of this system.

$$C_W = \log_2\left(1 + \frac{\rho}{8}\right) \frac{\rho}{8}$$

College of Electronic and Technology / Beni Walid
Department of Communication Engineering

Mid-Term Exam: December 2015
Subject: Wireless Communication System
Date: 3rd of December 2015

7th + 9th Semesters
Examiner: Dr. Masoud Eddaghel
Examination time: 90 Minutes

Q1 [6 marks]

(i) Draw the block diagram of Wireless Digital Communications

(ii) Write down the function of source encoder stage and channel encoder stage.

(iii) What are the challenges of wireless communication systems?

① high data rate (cap
increased large cove
of Servier

Q2 [4 marks]

(i) What does narrowband channel means?

(ii) What does wideband channel means?

Q3 [11 marks]

(i) Draw the schematic diagram of SIMO system contains of one transmit antenna and three receive antennas. (3)

(ii) Derive the mathematical equations to find estimated transmitted signal. (4)

(iii) What is the diversity gain of this system? (2)

(iv) If the SNR = 20 dB, find the normalized capacity (C/W) of this system. (2)

$$Dg = M_{tx} M_r = 1 \times 3 = 3$$

Q4 [4 marks]

(i) what are the gains which is provided by multiple antenna techniques?

(ii) Defined two of them

1 higher data Rate (capacitive)

2 increased covera area (rebit)

3 large cover of serf.

Good luck

College of Electronic Technology - Baniwalid
Department of Communications & Microwaves Engineering

Final Exam: Spring Semester
Subject: Wireless Communication System
Date: 10th of March 2020

7th Semester
Examiner: Dr. Masoud Eddaghel
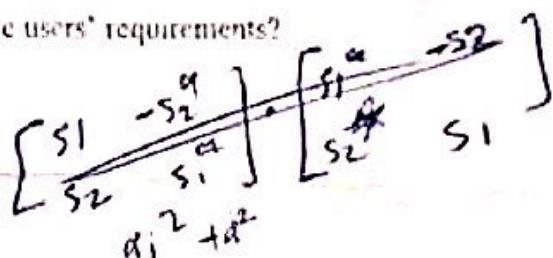Examination Time: 180 Minutes

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Q.1/ [8 marks]

1. Nominate at least one technique, which is 3G based on? → CDMA
2. What is the maximum possible data rate of 3G?
3. Nominate at least two techniques which are 4G based on? → OFDM, MC
4. What is the maximum possible data rate of 4G?

Q.2/ [4 marks]

1. What are the requirements of users to have a wireless network?
2. What are the challenges of engineers to achieve users' requirements?

Q.3/ [4 marks] Explain:

1. Free-space pathloss model.
2. Okumura model.

$$\begin{bmatrix} S1 & -S_2^a \\ S2 & S_1^a \end{bmatrix} \cdot \begin{bmatrix} S_1^a & -S2 \\ S_2^a & S1 \end{bmatrix}$$

$$a_1^2 + a^2$$

Q.4/ [30 marks] MIMO systems based on following matrixes. Assuming the system is working in faded channel

$$G_2 = \begin{bmatrix} s_1 & -s_2^* \\ s_2 & s_1^* \end{bmatrix} \qquad D_{6,3\times4} = \begin{bmatrix} s_1 & -s_2^* & s_3^* & 0 \\ s_2 & s_1^* & 0 & s_3^* \\ s_3 & 0 & -s_1^* & -s_2^* \end{bmatrix} \propto \begin{bmatrix} s_1 & s_2 & s_3 \\ -s_2^a & s_1^a & 0 \\ s_3 & 0 & -s_1 \\ 0 & s_3 & -s_2^c \end{bmatrix}$$

1. Check whether the following matrix are orthogonal or not. (Support your answer by analysis) [4]
2. What are the advantages of using orthogonal matrix?
3. Use one previous matrix to design MISO system.
4. Draw the block diagram of designed system

$$\begin{bmatrix} S1 & -S_i^* \\ S2 & S_1^a \end{bmatrix} \cdot \begin{bmatrix} S1 & S2 \\ -S_i^* & S_1^a \end{bmatrix}$$

$$S_1^2 + A$$

$$S_1^2 + S_2^2 =$$

$$S_1 S_2^* - S_1 S_2^* = 0$$

$$S_2 S_1 \cdot S_2 S_1 = 0$$

$$\begin{bmatrix} S1 & -S_2^* \\ S2 & S_1^y \end{bmatrix} \cdot \begin{bmatrix} S1 & S2 \\ -S_2 & S_1^* \end{bmatrix} = \begin{bmatrix} ^2 & \\ & 1 \end{bmatrix}$$

Q5 [12 marks] A SISO and MISO system exploit a 2 KHz and received power of each system in 4W and 20W, respectively. Both systems recommended to use BPSK, QPSK or 16QAM modulation schemes. Determine:

a) The received power of both schemes in units of dBW

b) The received power of both schemes in units of dBm.

c) Which modulation scheme can be used by SISO system? support your answer by analysis.

d) Which modulation scheme can be used by MISO system? support your answer by analysis.

Q6 [9 marks]

a) Why OFDM chosen as multiple access in upto date wireless system.

b) What is the function of cyclic prefix in OFDM system?

c) What is the condition in cyclic prefix?

Good luck

College of Electronic and Technology / Beni Walid
Department of Communication Engineering

Mid-Term Exam: December 2015
Subject: Wireless Communication System
Date: 3rd of December 2015

7th, 8th Semesters
Examiner: Dr. Masoud Eddaghel
Examination time: 90 Minutes

Q1: [6 marks]

(i) Draw the block diagram of Wireless Digital Communication.

(ii) Write down the function of source encoder stage and channel encoder stage.

(iii) What are the challenges of wireless communication system? تحديات

Q2: [4 marks]

(i) What does narrowband channel means? مش مهم (higher data rate) increased range of service

(ii) What does wideband channel means?

Q3: [11 marks] (اجبري)

(i) Draw the schematic diagram of SIMO system contains of one transmit antenna and three receive antenna. ... (5)

(ii) Derive the mathematical equation to find estimated transmitted signal. مهم جدا (4)

(iii) What is the diversity gain of this system? مهم جدا (2).

(iv) If the SNR = 20 dB, find the normalized capacity (C/W) of this system (2)

$$DG = MT \times MR = 1 \times 3 = 3$$

Q4: [4 marks]

(i) what are the gains which is provided by multiple antenna techniques? اهداف gains

(ii) Defined two of them. عرف اثنين منهم

1 higher data Rate (capacity)

2 increased covera area (reliability)

3 large cover of serf.

$$= H_s + n$$

Good luck

Q1: [12 marks]

a) What are the challenges of wireless communication system?
b) How to achieve these challenges?
c) What are the performance evaluation criteria of wireless system?
d) What is the BER reference of wireless system?

Q2: [3 marks]

a) Explain the concept of Alamouti space time coding (STC)   STDC

Q3: [10 marks] A MISO system contains of two transmit antennas and one receive antenna. Assuming the channel gain is one, which means the channel model is an AWGN channel.

a) Draw the schematic diagram of this MISO system. [1]
b) Derive the mathematical equations to find estimated received signal. [5]
c) Which practical wireless system can be considered as an AWGN channel? [2]

Q4: [15 marks] A MIMO system contains of two transmit antennas and two receive antennas.

a) Draw the block diagram of this system. [2]
b) Draw the schematic diagram of this system. [3]
c) Derive the mathematical equations to find estimated received signal. [5]
d) What is the diversity gain of this system? [2]
e) If the SNR = 20 dB, find the normalized capacity (C/W) of this system. [3]

Q5: [12 marks] A wireless system with a carrier frequency, $f_c = 1800$ MHz and a transmit power is 50W and applied to an antenna of gain 1, find:

a) The received power in dBm at a free-space distance of 100m from the antenna.
b) What is $P_r (10 \text{ km})$? Assume a gain = 2 for the receiver antenna and no system losses.
c) Express the transmit power in units of dBm and dBW.

$$\frac{P_r}{P_t} = \frac{G_t G_r \lambda^2}{(4\pi d)^2}$$

$$P_r = \frac{P_t G_t G_r \lambda^2}{(4\pi)^2 d^2 L}$$

Q6: [8 marks]

a) What are advantages of OFDM?
b) What are disadvantages of OFDM?

Good luck