CSCE 5520- Wireless Networks and Protocols

Homework 3

1. Explain the concept of frequency reuse in cellular networks. How does it contribute to efficient spectrum utilization, and what are the considerations in determining the frequency reuse pattern?
2. How does cell splitting, and cell sectoring increase the capacity of cellular network?
3. What role does 'paging' play in establishing a connection between two mobile phones?
4. Explain the role of handoff to maintain a call between two mobile phones?
5. Identify and discuss the challenges associated with the deployment and operation of 5G networks. How does 5G address these challenges compared to previous generations?
6. If a signal to interference ratio of 15 dB is required for satisfactory forward channel performance of a cellular system, calculate the frequency reuse factor and cluster size that should be used for maximum capacity if the path loss exponent is:

   a) n = 4.

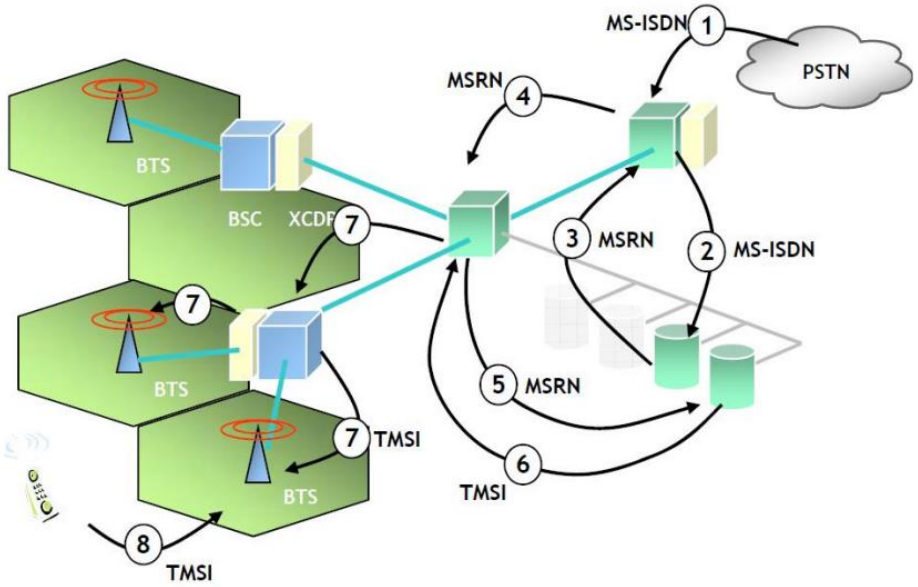
   b) n = 3.

   Assume that there are 6 co-channel cells in the first tier, and all of them are at the same distance from the mobile. Use relevant approximations for the final answers.

7. A total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses
   a. four-cell reuse,
   b. seven-cell reuse, and
   c. 12-cell reuse.

   If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each cell for each of the three systems.

8. The following figure illustrates how a mobile-terminated call for a roaming user is performed in a GSM network. Explain respectively what MS-ISDN (Mobile Subscriber ISDN number), MSRN (Mobile Subscriber Roaming Number), and TMSI (Temporary Mobile Subscriber Identity) are. Based on this figure, describe briefly how this roaming user is reached by a PSTN call initiator.



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