SSY145 Wireless Networks
Quiz A6 Answer Key
Date: May 1, 2020

The solutions are marked in **boldface**.

1. Which of the following statements about article "Spectrum management overview" is(are) true?

   (a) Fragmented spectrum will require devices to handle more interference scenarios.

   (b) Fragmented spectrum calls for aggregation of narrow frequency bands.

   (c) The downside of spectrum commons approach is imminent congestion due to increasing number of users.

   Motivation: With fragmented spectrum spread over seveal frequency bands, the equipment has to deal with very variable radio channels, as well as with the complexity created within the radio circuits themselves, to communicate using an aggregated number of narrower bands taken from a much wider total bandwidth. The commons approach is obviously attractive as long as the radio system works; the opposite is equally obvious, since many users can simply result in congestion and blocking.

   (d) There is a general trend towards more frequency bands being allocated to spectrum commons.

   Motivation: This is not the general trend while several argues for more spectrum to become available under a liberalized market-mechanism regime.

2. Which of the following is/are true about beamforming?

   (a) The combination of analog and digital beamforming is supported by NR.

   Motivation: It is possible to implement hybrid systems in order to get a trade-off between their advantages/disadvantages.

   (b) Analog beamforming gives unlimited degrees of freedom.

   Motivation: In analog is only possible to have finite degrees of freedom.

   (c) In digital beamforming every antenna has its own digital to analog converter and amplifier.

   Motivation: Due to this, high degree of freedom is possible in digital beamforming.

   (d) Only digital beamforming is supported by NR.

   Motivation: NR supports analog and digital beamforming, as well as their hybrids.

3. Which of the following is/are true about high-frequency spectrum in cities?

(a) It is needed to satisfy the traffic demands and possibly future demands as well.

Motivation: It has enough spectrum to satisfy the needs, but if and only if the carrier can propagate to all users.

(b) It improves the coverage area like buildings that lower frequencies couldn't penetrate in.

Motivation: The opposite is true. Lower frequencies are needed to cover more area due to the higher mm wave propagation attenuation.

(c) It is a replacement for the previous low-frequency operations.

Motivation: It can provide more data rate. But it can't completely replace the lower frequencies due to coverage difficulties.

(d) It is optimized when used in joint operations with lower frequencies.

Motivation: With the lower frequencies the service can now cover more range, and the higher frequencies improve data rates at easier-to-reach areas.

4. Which of the following statements is/are incorrect?

(a) In non-standalone NR, LTE handles initial access and mobility.

(b) The first 5G release is NR Release 16.

Motivation: No, it was released first in NR Release 15.

(c) In stand-alone NR, NR handles initial access and mobility.

(d) One of the NR characteristics is that it provides multi-antenna support.