2.7 Problems

2.1 In your place of work, how many modern wireless communications networks are available to you? Identify the types of services, the types of technologies, the commercial names of the service providers, and the commercial names of the equipment manufacturers that offer these wireless access capabilities.

2.2 In your home, how many modern wireless communications networks are available to you? Identify the types of services, the types of technologies, the commercial names of the service providers, and the commercial names of the equipment manufacturers that offer these wireless access capabilities.

2.3 Create a table that lists all 2G, 2.5G, and 3G mobile telephone standards. Carefully research the latest sources to determine the following parameters for each standard: a) RF channel BW; b) peak data rate; c) typical data rate; d) responsible standards body; e) maximum number of concurrent users; f) modulation type.

2.4 Conduct research to find out all of the accepted air interface standards for IMT-2000. Briefly describe the technical features and discuss the political and business motivations of each of the groups that proposed the winning standards. What is your favorite IMT-2000 standard? Justify your answer.

2.5 Specify the unlicensed frequency bands and the channel assignment plans that European, Japanese, and North American wireless local area network (WLAN) equipments are allowed to use within the 2 to 6 GHz range. How does international frequency compatibility help the growth of air interface standards in an unlicensed frequency band?

2.6 Why would an entrenched US wireless carrier announce that its long term plan is to abandon its IS-136 North American Digital Cellular standard in favor of a W-CDMA 3rd generation standard with foundations in GSM? Consider the decision in the face of the following business, political, and technical considerations: a) availability of low price equipment from manufacturers; b) compatibility with competing US wireless carriers; c) compatibility with carriers it considers its business allies; d) compatibility with wireless carriers outside of the US; d) access to field-proven equipment that provides off-the-shelf 3G capabilities; e) domain experience by its current engineering staff; f) cost and maintainability of the infrastructure; g) other factors not mentioned above.

2.7 If an IS-136 operator desires to provide competitive high speed Internet access to customers, it must choose to either adopt GPRS, or alternatively it may wish to change out its existing infrastructure to GSM and then use the various options available to GSM operators. Conduct a literature search to determine the current state of GPRS for IS-136 carriers. Given your findings, what is the most sensible option for the IS-136 carrier based on price, availability, and user experience?

2.8 Compare and contrast the various 2.5G technology paths that each of the major 2G standards provide. Which path has the highest Internet access speed? Is this speed true user speed, or peak instantaneous throughput speed? Which technology path is easiest to implement in existing subscriber handsets? Which path would be best suited for real-time network access?

2.9 How would multicarrier transmissions impact an operator's approach to allocating resources to accommodate a growing subscriber database that increasingly desires data connectivity over voice? How would heavy HSCSD usage impact a cellular carrier's strategy in allocating channels in the base stations of a cellular network? How would the rapid adoption of Voice over Internet Protocol (VoIP) impact cellular congestion? Explain.