

***KFUPM - COMPUTER ENGINEERING DEPARTMENT*****COE-543 – Mobile Computing and Wireless Networks****Student Name:****Student Number:**

- 1) (20 points) For the introduction material, multiple examples of networks were briefly described in class/notes. Give one example network *and* specify its adopted access technique (i.e. FDMA, TDMA, CDMA, OFDMA, etc.):
- 2<sup>nd</sup> G - Wireless wide area voice oriented network
  - 3<sup>rd</sup> G Wireless wide area voice oriented network with data capabilities
  - Wireless local area data oriented network
  - Wireless wide area data oriented network

Solution:

- 2<sup>nd</sup> G - Wireless wide area voice oriented network: (GDM, TDMA), (IS-95, CDMA)
- 3<sup>rd</sup> G Wireless wide area voice oriented network with data capabilities: (UMTS, CDMA), (DECT, TDMA/FDMA), etc.
- Wireless local area data oriented network: (IEEE802.11a/b/g, CSMA/CA based)
- Wireless wide area data oriented network: (mobile WiMAX, OFDMA), (WiMAX, contention-based, polling, reservation), (GPRS, ALOHA-type), (CDPD, CSMA-based)

- 2) (20 points) List the five 3G candidate systems and describe each system by one sentence specifying the underlying technology.

Solution:

- EDGE - GSM evolution, i.e. TDMA - Legacy; sometimes referred to as 2.75G - paired spectrum band
- CDMA 2000 - Multi Carrier CDMA - Evolution of IS-95 CDMA - paired spectrum band
- UMTS/3GSM (W-CDMA, HSPA) - Direct Spread CDMA - Defined by 3GPP - paired spectrum band
- TD-SCDMA - Time Division Synchronous CDMA - Defined by Chinese Academy of Telecommunications Technology under the Ministry of Information Industry - Single spectral band with time division duplexing
- DECT - TDMA based cordless telephony system for business communications - Single spectral band with time division duplexing

- 3) (10 points) List *three* new systems that are sometimes promoted as 4G candidate systems.

Solution:

- WiMAX - ~6 million units by 12/2008?
- Flash-OFDM - ~13 million subscribers in 2010 ?
- 3GPP Long Term Evolution (LTE) - 2010 launch
- UMB in 3GPP2 - extent of adoption is uncertain
- IEEE 802.20 - adoption uncertain