Introduction to ICT for Development
Course code: 2I4360, 2I1160, IB7000

Re-Quiz 2

"Connectivity Challenges"

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PART 1

Kafanchan is a small town in rural Nigeria with no Internet connectivity. The national power grid passes though the town.

Your task is to connect 5 sites (A, B, C, D and E) in Kafanchan to Internet having the following equipment at your disposal:

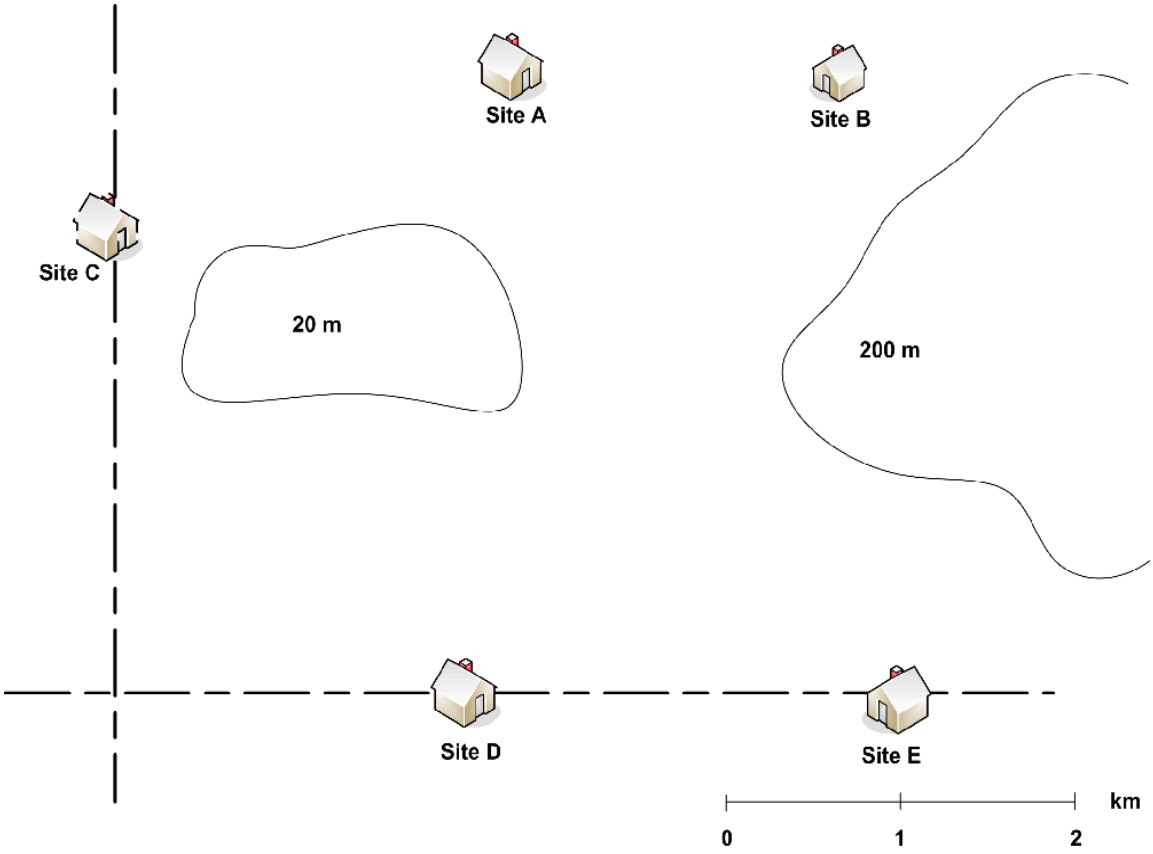
- 1 communication tower, 50 m
- 1 complete VSAT set
- 7 set of WLAN equipment (access point, low-loss cable, external antenna)

The following information is given about the sites:

Site A: Primary School, not connected to the power grid
Site B: Secondary School, not connected to the power grid
Site C: Hospital, connected to the power grid
Site D: Evangelic Church, connected to the power grid
Site E. NPO[1] (Training Center of Basic Computer Skills), connected to the power grid.

All sites (A, B, C, D and E) are located in one-storey buildings.
The area of Kafanchan is completely flat except for two plateaus that are 20m respectively 200m high.

1 Non-Profit Organization



Questions:

Please describe how you would connect the 5 sites using the equipment listed above.

1. Describe where you would place the VSAT equipment and justify why.
2. Describe where you would establish the communication tower and justify why.
3. What additional resources would you need to provide power to all devices in the network?

You should aim for designing a cost efficient but sustainable solution.

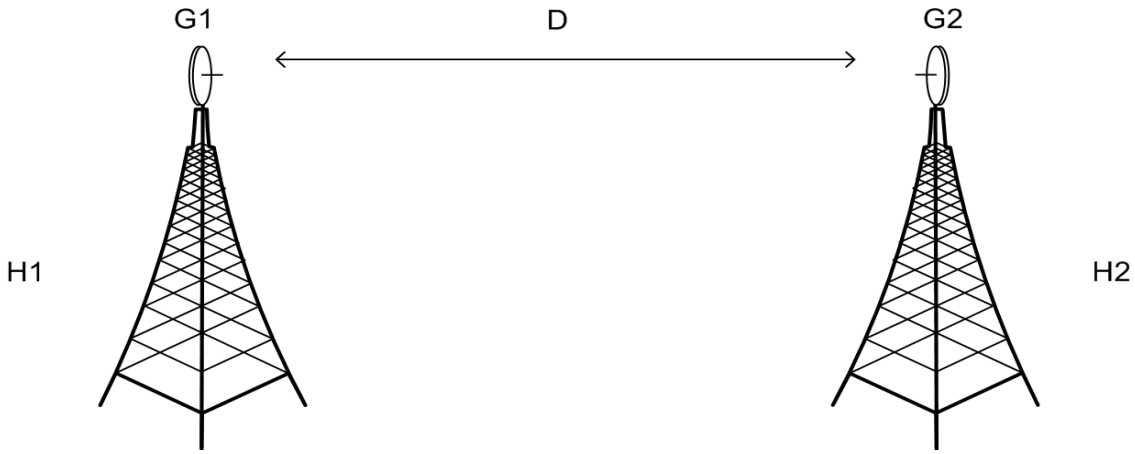
Note! An answer without justification is not valid.

PART 2:

Compare WLAN (IEEE 802.11) and WMAN (IEEE 802.16) by identifying 5 main differences and describing what those differences imply in a wireless implementation.

PART 3:

a) Calculate the minimum gain needed in the antennas to create a functional link according to the specification and assumptions below.



- Transmitter output power: 15dBm.
- Coaxial cable: RG213 (0,7dB per 10m)
- Connectors: 1 dB /connector
- H1=H2=50m
- D=5000m
- Receiver sensitivity: -95 dBm
- Margin: 6dB

- The transceivers are placed at the bottom of each of the radio towers. (i.e. The cable length is equal to the radio tower's height)
- The maximum radiated power is 500 mW due to legal regulations.
- The same antennas will be used in both sides (G1=G2).

b) Justify your answer by using the mathematical equation for a link budget.

c) How much is the transmitted power and is the link legal?