

# Masters Programmes in Communications

## Introduction to Telecommunications Networks (ITN)

2020/21

Assignment Issued: 06 November 2020

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### ***Guidelines:***

- Assignment to be handed in by: **12.00 Monday 23 November 2020.**
  - Submissions should be no more than **11 pages** in total length (not including cover page, tables of contents, tables of references and appendices), with font size no smaller than **12pt.**
  - All sources must be properly referenced.
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## 1 Scenario

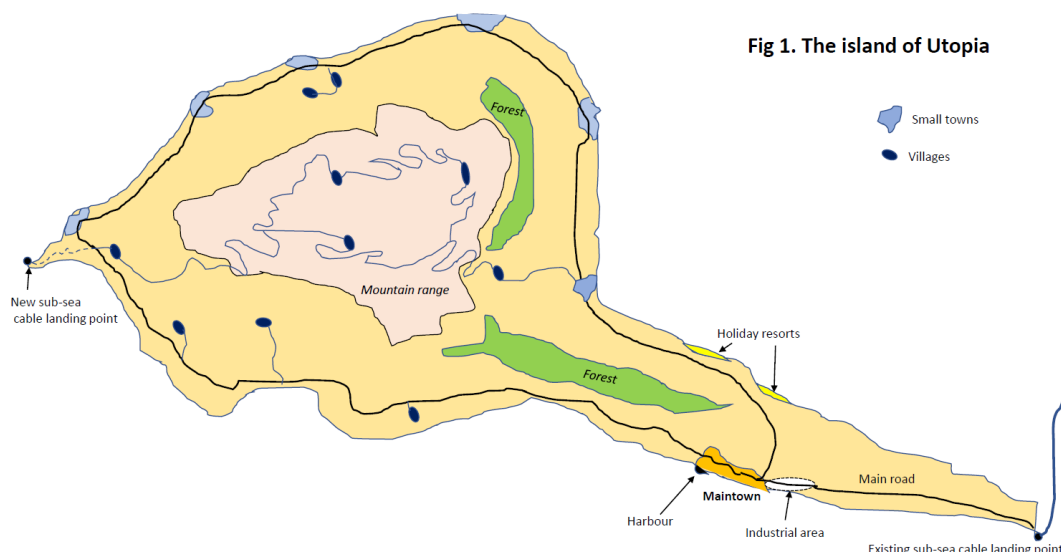
Utopia is a small, independent, island nation. It currently has a population of around 1.5 million. The geography of the island is dominated by a central mountain range where the population density is relatively low and the main industries are agriculture and tourism. Most of the population are concentrated in Maintown, where all the main businesses have their headquarters and where a nascent financial services industry is starting to develop. With a GDP per capita of US\$6,300 in 2019, Utopia is classified by the World Bank as a **Lower middle-income economy**. The climate is tropical with frequent hurricanes and monsoon rainstorms. The island has an excellent electricity distribution network; unfortunately, its telecommunication infrastructure and services lack behind and is in serious need of modernisation.

The Government has a 5 year plan to develop the economy by encouraging inward investment and a diversification of the industrial base. Modernisation of the Telecommunications infrastructure is a critically important element of this strategy.

**In particular, the Government wants to do the following:**

- 1- turn the largest town into a smart city;
- 2- improve broadband access, especially in the rural areas;
- 3- modernise the mobile network (currently only 2G/3G); and
- 4- improve connectivity to the outside World.

A simplified map of Utopia is shown in Figure 1. Please note the roads connecting the towns and villages and the topographic features. Remember it is easier to lay cables along roads than in the middle of a forest.



**Figure 1: Simplified Map of Utopia**

## 2 Assignment Guidelines

You are required to produce a report for the national regulator (Utopiacom) proposing, with reasons, which technologies should be used in the various projects for developing the telecommunications and ICT infrastructure and services. Utopiacom has divided the network modernisation project into seven sub-projects, all listed below.

Your report needs to address (briefly) the overall network modernisation plan and address in more detail **only four** of the six sub-projects below:

1. Upgrade of **Core transport** network (the transmission links between towns)
2. Introduction of a new separate sub-sea cable landing point.
3. Introduction of High-speed broadband access.
4. Introduction of 5G mobile.
5. The design of the IP network(s), considering two aspects:
  - i) the **network technology**, considering plain IP or IP with MPLS, and
  - ii) the design of at least **two autonomous systems**, including their addressing and how they interconnect and exchange inter-domain routing traffic.
6. Conversion of the Maintown to a smart city that requires the design of the IoT system, knowing that the government is interested in:
  - i) smart buildings with optimised energy consumption, and
  - ii) security cameras around the city. Outline what types of **sensors**, types of **connectivity** and types of **data analytics** are needed for each **of the two goals**.  
Comment on the pros and cons of using the cloud for video content.

Your report should take into consideration the requirements of the government detailed above, the types of technologies to be used for signal transmission and for the telecommunications networks and infrastructure. You can be specific and refer to technologies from specific vendors or be general and only specify what you consider as key parameters.

Your assignment answer should be in your own words, with appropriate use of charts and figures in a document of no more **than 11 pages in** length; one page must be the assignments **"Executive Summary"**. For the document use minimum font size 12 and 2.54 cm margins all around. Any diagrams or wording taken from external sources must be clearly identified and referenced.

If necessary, additional supporting material may be presented in appendices, which are **not** included in the page count. Your document must be divided into appropriate sections, with clear **section headings**, **page numbers** and reasonable margins. Should you decide to include a table of contents this will also **not** be included in the page count.

## Introduction to Telecommunications Networks (ITN) 2020

The document should have a cover page clearly displaying the following information:

- Introduction to Telecommunications Networks (ITN) Assignment
- Submission Date
- Student candidate number and student number
- Programme of Study: (e.g. MSc Telecoms, WOC, IE or CPD)

The cover page is **not** included in the page count.

**It is extremely important that all sources of information are properly credited and referenced.** The inclusion of any figures or diagrams from web sites or documents must be contain a reference to the original source **in the figure caption**. You are strongly advised to adhere to a standard referencing format, such as Harvard or Vancouver format. The reference list is **not** included in the page count.

You will gain extra marks for demonstrating the strength of your own independent research and knowledge of the relevant primary sources. Marks will be deducted for poor report structure, sloppy or unclear language and incomplete or improper referencing of third-party sources.

**END OF ASSIGNMENT QUESTION**