ITS323 – Assignment 1

1   Aims

The aims of this assignment are:

1. Learn about current LAN, DSL and audio encoding technologies.

2. Relate real-world technologies with the concepts covered in ITS323.

3. Gain experience in technical writing, in particular describing communication networks and technologies.

4. Gain experience in creating a simple web site.

2   Tasks

Consider the following scenario. SIIT is establishing an off-campus training centre, where SIIT faculty (and invited lecturers) will offer technology-related training to students and the public. The training centre will be in an existing building (not currently in use) with 3 floors. The ground (1st) floor will contain a front desk and large open space. The 2nd floor will contain two computer labs, each containing 20–30 computer workstations. The 3rd floor will contain meeting rooms and several offices.

   Your group have been assigned the responsibilty to design the network and related applications. There are three aspects of the design that you must consider in this assignment:

A. Connection from building to external networks (i.e. the Internet, and eventually back to other SIIT campuses). Currently only option available is DSL.

B. LAN covering the building. It has already been decided to use a combination of wired and wireless LAN in all floors.

C. Audio codecs to be used in recording training sessions and meetings, to be used for both live-streaming and playback at later times. Note that the audio may not always be just voice; music may need to be recorded sometimes.

   For each you are to give technical descriptions of the technologies (see below) such that a reader can understand that technology. You should refer to techniques and concepts covered in the course (e.g. data rate, frequency, signal encoding, error control, protocol architectures).

   Also, you need to present and/or select design options. For this, you may need to make some assumptions—if so, be sure to clearly state those assumptions. When considering an option you should include technical factors (e.g. data rate), as well as non-technical factors (e.g. cost, licensing).

   The specific tasks are described in detail below.

2.1   Internet Connection

Your tasks are to:

A.1 Give a technical description of ADSL. [1–2 pages of text plus tables/figures]

A.2 Present at least 3 options of DSL packages that may be appropriate for the connection. Compare based on technical characteristics, as well as cost. [Tables, several paragraphs of text]

A.3 Discuss two alternatives to DSL that could be used and the different trade-offs. [Several paragraphs]

2.2   Building LAN

Your tasks are to:

B.1 Give a technical description of IEEE 802.11 wireless LANs. [1–2 pages of text plus tables/figures]

B.2 Present a network design, in the form a diagram, showing the devices and links in the building. [Figures with paragraphs explaining them]

B.3 Present at least 3 different options of wireless LAN access points that may be appropriate for the building. Compare based on technical characteristics, as well as cost. [Tables, several paragraphs]

2.3   Audio Codecs

Your tasks are to:

C.1 Give an explanation of the different types of audio codecs: uncompressed, lossless compressed and lossy compressed. [1 page of text]

C.2 Select at least 1 codec from the above three types and compare them based on technical characteristics. [Tables, several paragraphs]

C.3 Perform an experiment comparing the three codecs from above, using different parameter values for each, for one or more of your own recordings. Include your recordings in you report. [Tables, several paragraphs, links to recordings]

3   Group Work

This is a group assignment. You must form a group of 3 students and inform me of the group members by email before 4pm Friday 19 August 2011. I will use the first student in your list for the designated website (see Section 4). I will then assign numbers to each group. If you haven't informed me of your group by 4pm, I will randomly assign you to a group. You may mix between the CS and IT sections.

Each student is required to participate in the assignment. That includes particpation in the research (reading about the technologies and discussion with the other group

members) and the writing of the report. If a student is not helping in the assignment, then you should let me know early in the assignment so I can discuss with that student.

In your report you must include a table that identifies who was involved in the research and writing of each section. An example of such a table which shows the percentage that each student contributed to tasks is in Table 1.

Table 1: Example table of participation

Task	Student1	Student2	Student3
A.1	50	40	10
A.2	33	33	33
B.1	100	-	-
B.2	-	100	-
...	20	40	40

4 Report

You must deliver a single report per group, as a website. The website is to be available via a designated students IT server account. For example, if student with ID 5222123456 is the designated student, the URL of the group report must be:

`http://it.siit.tu.ac.th/~u5222123456/its323/`

That is, if student 5222123456 logs in to the IT server, they must store their report in the directory: `/home/students/u5222123456/public_html/its323/`.

You are free to create the website however you wish so long as you use common web standards (e.g. HTML, PNG/JPG, CSS, JavaScript; *no Flash*). You should make appropriate use of links, especially for references.

The website must contain: information identifying the course, project title, group members; table of participation (see Section 3); and answers for each of the tasks.

In Section 2, in square brackets, I give guides of how much and what type of content is expected in each task. However they are just guides, and you may have more or less (or different types) than what I specify. As a guide of the level of detail necessary, consider the following.

A "comparison" requires both listing of the features, as well as discussing the advantages and disadvantages. For example, it is easy to find the frequencies used by a technology. You should list the frequencies, as well as comment on the advantages/disadvantages, e.g. *"The frequency of 2.4GHz has the advantages that it is ..., whereas using a frequency of 5GHz is better for ...".*

If there is a algorithm/technique that a technology uses but you do not understand it, then learn about it and try to briefly explain it. For example, if the signal encoding technique is called *ABCD*, don't just list it—also explain it, e.g. *"ABCD is a variation of Binary Phase Shift Keying but it uses ....*

The report should be written such that a student that has studied (and passed!) ITS323 would understand it. For example, you can assume the reader knows about what we have covered in the lectures—you don't have to explain what bandwidth, PCM or stop-and-wait are.

As with all reports, define an acronym when you first use it, e.g. *"This technology uses Phase Shift Keying (PSK) ...".*

5 Submission

You must create your report on the IT server during the assignment. I recommend uploading to and editing on the IT server as you go (rather than uploading all of your website just before the deadline).

The deadline is 12noon Monday 19 September 2011. At this time, I will execute a script on the IT server that prohibits all students from editing their its323 website directories. For example, after 12noon student 5222123456 will not be able to add, edit or delete any files in the directory: `/home/students/u5222123456/public_html/its323/`. There will be no opportunities for changes or submissions after the deadline.

6 Marking Scheme

A maximum of 25 marks will be allocated for each task (A, B and C). You will be evaluated on the completeness of the tasks, correctness of the information, and coverage, i.e. suitable detail. In addition, presentation is with 25 marks. This includes the structure of the web site, sections, clear tables and figures, formatting and clarity of explanations. Up to 25 bonus marks may given for exceptional reports.

7 Plagiarism

There are three types of "copying" that are common and which are not allowed in this assignment:

1. Copying text either directly or with slight modifications from other sources such as websites and textbooks. This is **not** allowed. Instead, read the text, understand what it is saying, discuss with the other group members, and then write your report in your own words. (A good way to assist is to make sure you don't have a web browser or textbook open when you are writing the report).

2. Copying pictures and tables from other sources. This is **not** allowed. Instead, for a picture think about what it is showing and re-draw it to suit your report. Often the pictures you find will be too complex or use difficult terminology for what you need to explain—hence re-draw showing the main point that you intend to make. For tables, you may re-use the data found in websites and textbooks, but again create your own table showing only the relevant data.

3. Copying from other groups (again, either directly or with some modifications). This is **not** allowed. This is a group assignment. You may discuss with other groups but you must not show other groups your report.

If evidence of the first two items is found in a report, then *all* group members will be penalised. Similarly, if evidence of the third item is found in reports, then all groups will be penalised.