CARLETON UNIVERSITY

Department of Systems and Computer Engineering
SYSC4700 Telecommunications Engineering 2013

Professor Halim Yanikomeroglu

TERM PROJECT

Revenue-Generating Novel Applications in Future Cellular Networks

SUBMIT TWO HARD COPIES OF THE REPORT IN THE ASSIGNMENT BOX BY 4:00 PM, FRIDAY, APRIL 12.

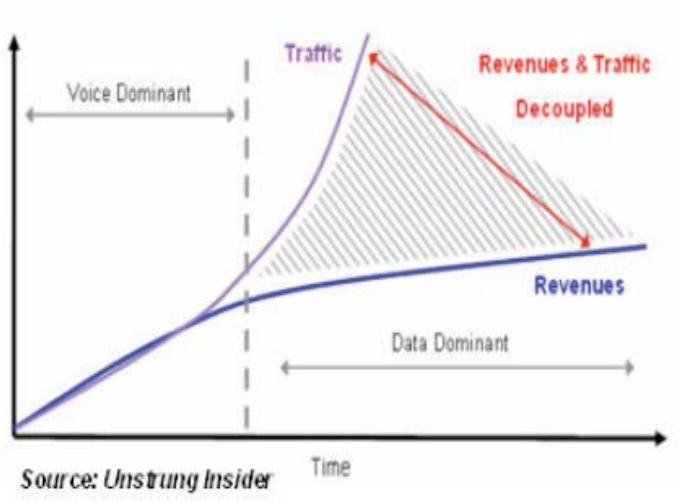
AWARD: $250 for the best project with a certificate (Acknowledgment: Department of Systems and Computer Engineering).

1. Context

The communications theory is a well established field whose origin could be traced back to approximately the early 20th century. This rich theory has found a very successful application since the 1980's – the mobile telephony through wireless cellular networks.

Despite the profound advances in wireless technologies during the last few decades, the wireless community faces the challenge of enabling a further traffic increase of up to 1,000 times in the next 10 years or so, while no customer is willing to pay more for the wireless pipe itself: the so called "traffic-revenue decoupling" [1]-[4] (refer to the below figure).

On the positive side, there has been a surge in wireless internet usage through a plethora of gadgets in the last few years; moreover, there seems to be a consensus amongst experts that the current surge is only the tip of the iceberg. The recent as well as the anticipated advances in the hardware (including devices and displays) and software (including cloud computing) technologies will likely lead to a broad range of unprecedented applications in the coming years.



2. Description

Assume that your group is a team of engineers working for a leading cellular operator around year 2025. Your task is to develop value-added and revenue-generating novel applications to be offered through in cellular networks of the time, 4G LTE-Advanced and 5G.

Note that an excellent example of a revenue-generating application in 2G GSM networks was SMS (short message service) [5].

There is abundant material on LTE-Advanced and the 5G roadmap in the internet (for instance, [6]), and in IEEE magazines [7].

Note that this project is not about "apps"; the term "application" is used in its broadest sense in this outline. Your proposed applications may be in one or more of the following sectors: healthcare, intelligent transportation systems, education, entertainment, security, surveillance, environment, smart grid, etc. Also note that he project involves 5G scenarios which are not well defined at the moment. Therefore, your creativity will play an important role.

3. Requirements

The report will address the followings, in separate sections:

- Briefly describe

- 4G LTE-Advanced
- 5G

- In the light of the previous sections, propose a revenue-generating application.
- Discuss the technical requirements (transmission rate, latency, reliability, etc.) for this application.
- Discuss the technology, hardware, software, etc., necessary for this application.
- Propose a pricing scheme for this application.

Carefully substantiate your claims. Note that this is not a science-fiction project; rather you are trying to make projections for the beyond-4G networks.

4. Report

A group is normally formed by three or four students. Two-member groups are not allowed.

There are two deadlines ahead of you:

- Deadline 1: 4:00 pm, Friday, March 8. Email the names of your group members to the course TAs Alireza Sharifian (alireza@sce.carleton.ca) and Akram Bin Sediq (akram@sce.carleton.ca), with cc to me (halim@sce.carleton.ca). **This e-mail must be copied to all group members.**
- Deadline 2: 4:00 pm, Friday, April 12. Two copies of the final report due in the course assignment box.

Missing the first deadline may result in some penalty in your overall mark for this project.

Each group will write one report, and will submit it in two hard copies. All group members will get the same mark. It is up to your group to organize the work and allocate tasks to group members. Your group output will be a report which addresses the above issues. Include references (papers, books, internet, etc.), with enough information that they can be verified by readers.

Do not copy from other sources (especially from internet) or use others' ideas, unless they are acknowledged and properly referenced. Violating this rule amounts to plagiarism, which is a serious instructional offence (see "instructional offences" in the undergraduate calendar, and www.plagiarism.org for definitions and examples of plagiarism). Reference to "other sources" also includes any overlap of your own work in other courses, such as fourth year projects, for example.

The report itself (without figures) should be no more than 10-15 pages of double-spaced text; you may put as many figures as you deem appropriate. Your marks will be based on the correct knowledge and persuasiveness revealed in your report, its organization, coherence and clarity, and use of references.

References

[1] Bengt Molleryd, Jan Markendahl, Jan Werding, and Osten Makitalo, "Decoupling of revenues and traffic – Is there a revenue gap for mobile broadband?", in *Proc. 9th Conference on Telecommunications Internet and Media Techno Economics (CTTE)*, 7–9 June 2010. DOI: 10.1109/CTTE.2010.5557696.

[2] Greger Blennerud, "The recipe for mobile broadband profitability", Ericsson Business Review, no. 3, 2009. Available online at http://www.ericsson.com/ericsson/corpinfo/publications/ericsson_business_review/pdf/309/309_the_recipe_for_mobile_broadband_profitability.pdf.

[3] Greger Blennerud, "Mobile broadband – busting the myth of the scissor effect", Ericsson Business Review, no.2, 2010. Available online at http://www.ericsson.com/ericsson/corpinfo/publications/ericsson_business_review/pdf/210/210_strategy_mobile_broadband.pdf

[4] Halim Yanikomeroglu, "Moving forward in cellular", SYSC 4700 Lecture Notes, 06 March 2013, Carleton University.

[5] http://en.wikipedia.org/wiki/Short_Message_Service

[6] 3GPP Release 12 Workshop, Ljubljana, 11-12 June 2012. Check out 42 presentations available online at http://www.3gpp.org/Future-Radio-in-3GPP-300-attend.

[7] IEEE Communications Magazine, IEEE Wireless Communications, IEEE Networks, IEEE Vehicular Technology Magazine.