CARLETON UNIVERSITY

Department of Systems and Computer Engineering

SYSC 4700 **Telecommunications Engineering** **Winter 2018**

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Assignment 2 [75 pts]

Posting date:	**01 February 2018**
Due date:	**2:00 pm, Monday, 12 February 2018**
Where to submit:	**Assignment box, Mackenzie 4th floor, 4th wing**
Late submissions:	**No late submissions (please)**

Review

It was discussed in the lectures that the peak data rate, R_{max}, can be calculated as

$R_{max} = n\ B\ SE$ [bits/sec], where

- $n = \text{minimum}(n_{tx},\ n_{rx})$, where n_{tx} and n_{rx} denote the number of antennas at the transmitter and the receiver, respectively (n is often referred to as the MIMO gain),

- SE is the peak SISO spectral efficiency [bits/sec/Hz],

- B is the total bandwidth [Hz].

Q1 [25 pts] Data Rates

In a wireless system these parameters are given as follows: $n = 100$, $B = 300$ MHz @ 1 GHz carrier, $SE = 30$ bits/sec/Hz.

- Calculate R using the above values.

- Discuss how realistic the given n, B, and SE values are (justify your answer).

Q2 [50 pts] 5G Wireless Cellular Networks

The 5G wireless standardization is currently taking place. The 5G Phase 1 (3GPP release-15) is expected to come out in June 2018 and 5G Phase 2 (3GPP release-16) in December 2019. Deployments will likely start in 2020 and afterwards. There is plenty of material in the internet on 5G.

- By browsing the internet, state the target 5G downlink peak data rates (shared by all the wireless terminals in a cell). Mention the URL you used.

- Suggest realistic values for n, B, and SE, based on the 5G rate targets. Substantiate your suggestions with a brief discussion.