**The University of New Mexico**

**School of Engineering**

**Electrical and Computer Engineering Department**

**ECE 535 Satellite Communications**

**Student Name: Alex Hostick**

Student SN: 2O1

Module # 12-3: 12.27, 12.28, 12.29, 12.31, 12.33, 12.35

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**Prof. Tarief Elshafiey**

**12.27 Determine the carrier-to-noise density ratio at the satellite input for an uplink, which has the following parameters: operating frequency 6 GHz, saturation flux density -95 dBW/m2, input BO 11 dB, satellite [G/T] -7 dBK-1, [RFL] 0.5 dB. (Tabulate the link budget values as shown in the text).**

= 78.1dB

**12.28 For an uplink the required [C/N] ratio is 20 dB. The operating frequency is 30 GHz, and the bandwidth is 72 MHz. The satellite [G/T] is 14.5 dBK-1. Assuming operation with 11 dB input BO, calculate the saturation flux density. [RFL] are 1 dB.**

**(a) Calculate flux density**

**12.29 For the uplink in Prob. 12.28, the total losses amount to 218 dB. Calculate the earth station [EIRP] required.**

Losses = 218dB

**12.31 The following parameters apply to a satellite downlink: saturation [EIRP] 22.5 dBW, free-space loss 195 dB, other losses and margins 1.5 dB, earth station [G/T] 37.5 dB/K. Calculate the [C/N0] at the earth station. Assuming an output BO of 6 dB is applied, what is the new value of [C/N0]?**

|  |  |
| --- | --- |
| **Quantity** | **Decilogs** |
| [EIRP] | 22.5 |
| [FSL] | -195 |
| [LOSSES] | -1.5 |
| [G/T] | 37.5 |
| [k] | 228.6 |

**(a) C/N0 at earth station**

**(b) C/N0 with BO = 6dB added**

**12.33 The [C/N] values for a satellite circuit are uplink 25 dB, downlink 15 dB. Calculate the overall [C/N] value.**

**12.35 A satellite circuit has the following parameters:**

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Description automatically generated**

[LOSSES] = [FSL] + [RFL] + [AA] + [AML]

[GAIN] = [EIRP] + [G/T] + [k]

Uplink

[LOSSES] = 200 + 2 + 0.5 + 0.5 = 203

[GAINS] = 54 + 0 + 282.6 = 282.6

Uplink = [EIRP] – [LOSSES] = 282.6 – 203 = 79.6

Downlink

[LOSSES] = 198 + 2 + 0.5 + 0.5 = 201

[GAINS] = 34 + 17 + 228.6 = 279.6

Downlink = [EIRP] – [LOSSES] = 279.6 – 201 = 78.6