Faculty of Engineering & Technology

Electrical & Computer Engineering Department

WIRELESS AND MOBILE NETWORKS: ENCS5323

Project: Online Calculator

Prepared by:

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Instructor: Dr. Mohammad Jubran

Section: 1

Date: 23-6-2023

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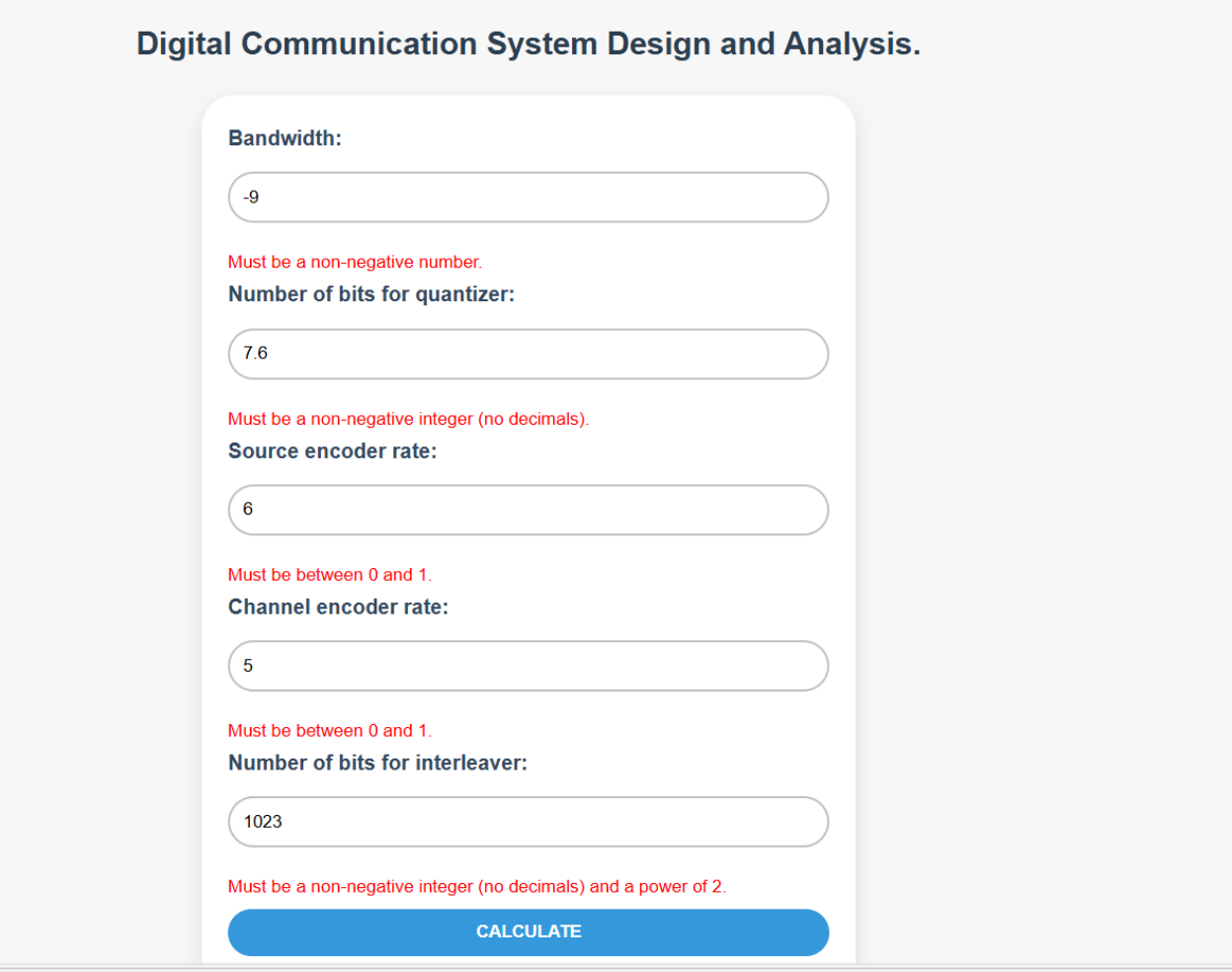
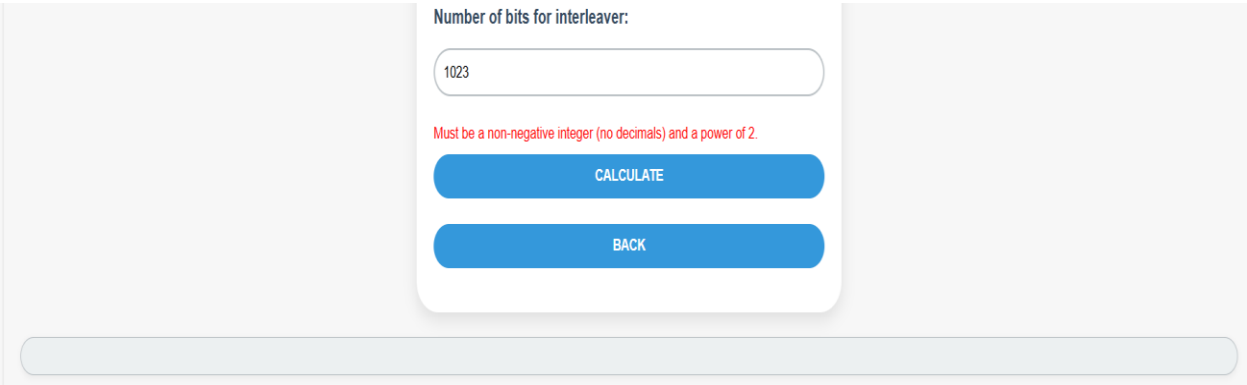
Application1

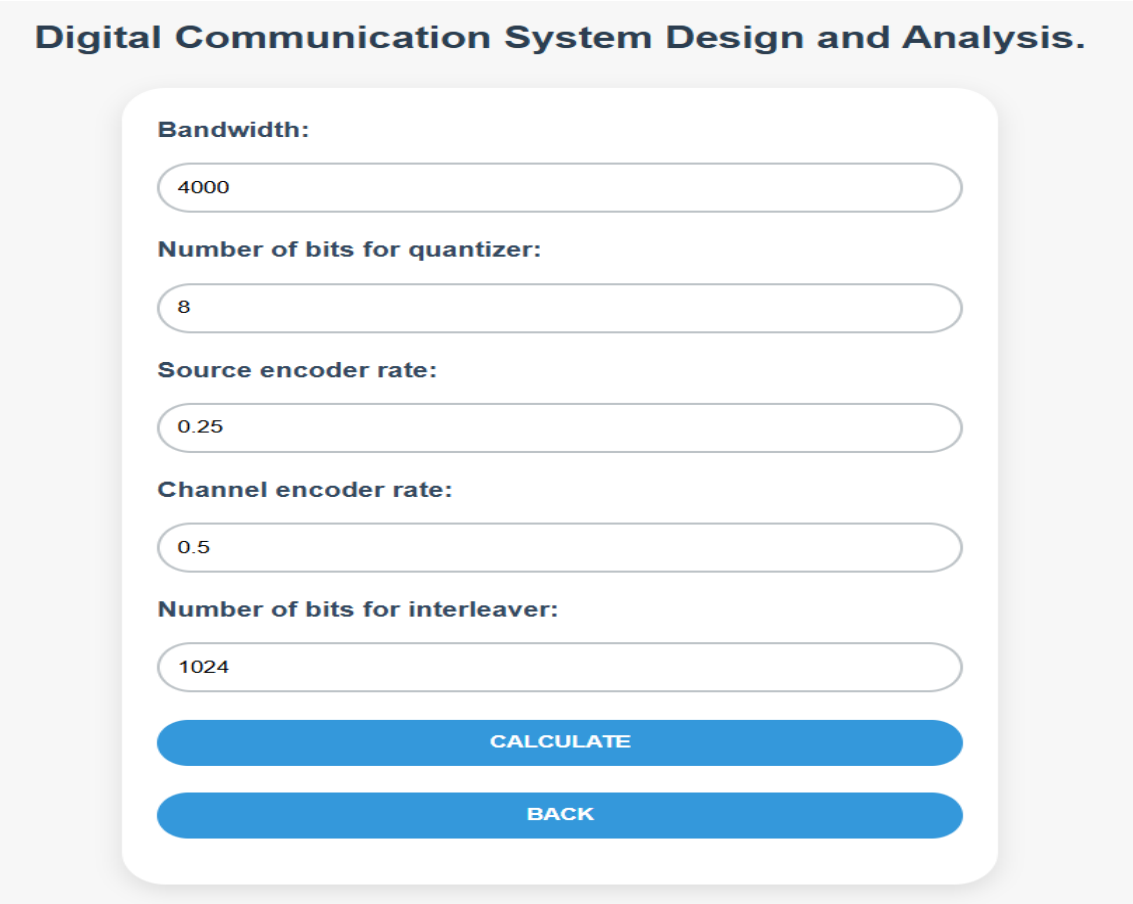
Validation





There is no output.

Scenario1 (midterm)



The Sampling Frequency = **8000** Samples/s

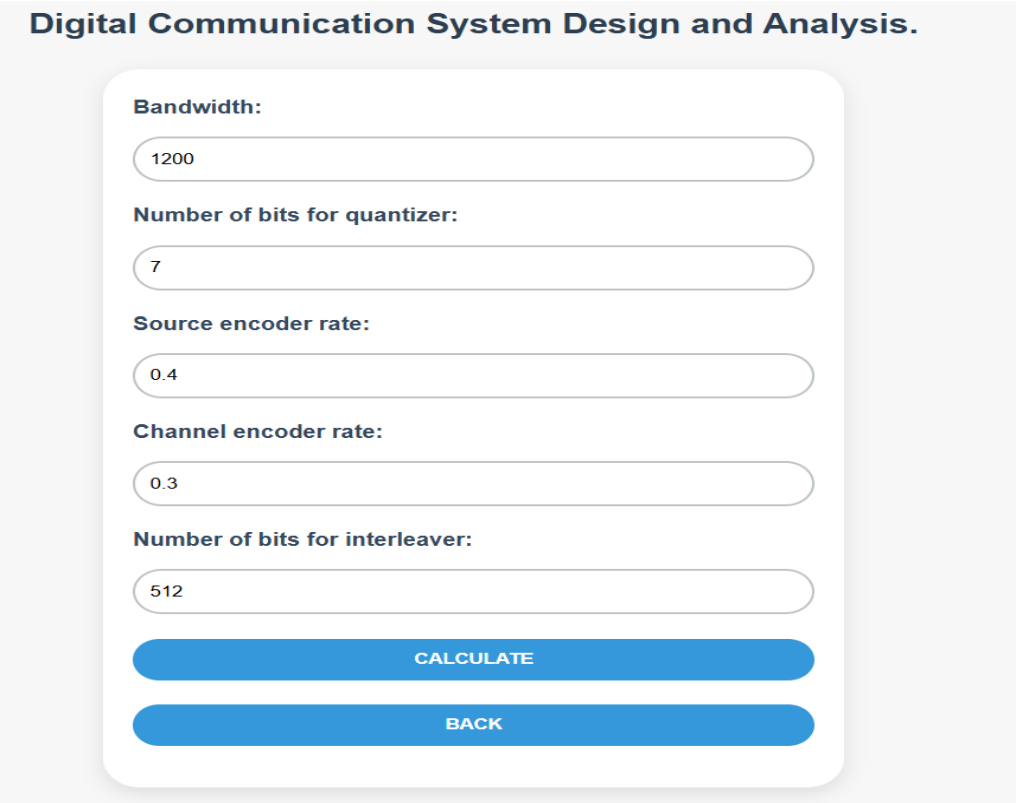
The Number of Quantization Levels = **256** Levels

The Bit Rate at the Output of the Source Encoder = **16000** bits/s

The Bit Rate at the Output of the Channel Encoder = **32000** bits/s

The Bit Rate at the Output of the Interleaver =**32000** bits/s

Scenario2



The Sampling Frequency = **2400** Samples/s

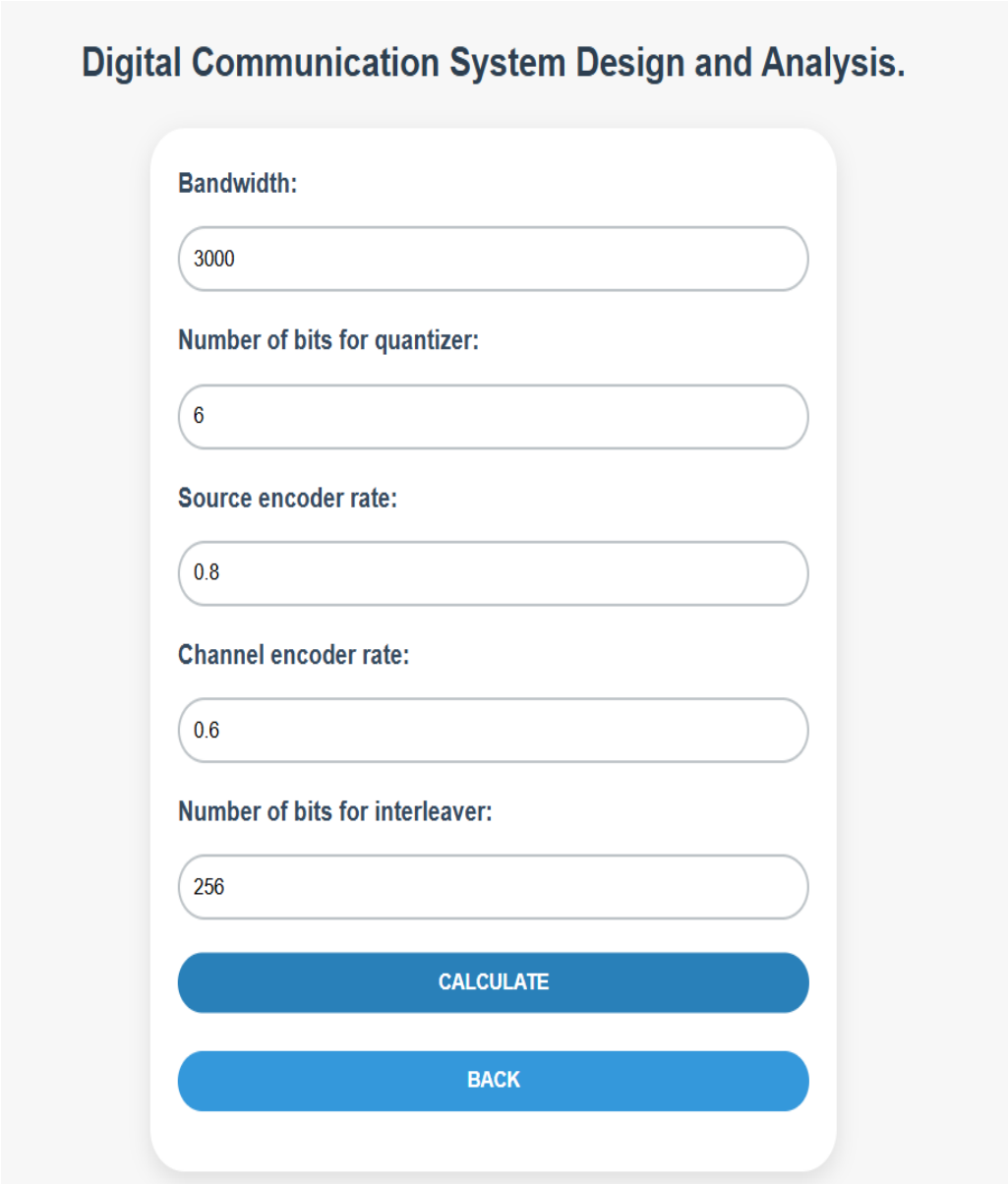
The Number of Quantization Levels = **128** Levels

The Bit Rate at the Output of the Source Encoder = **6720** bits/s

The Bit Rate at the Output of the Channel Encoder = **22400** bits/s

The Bit Rate at the Output of the Interleaver =**22400** bits/s

Scenario3



The Sampling Frequency = **6000** Samples/s

The Number of Quantization Levels = **64** Levels

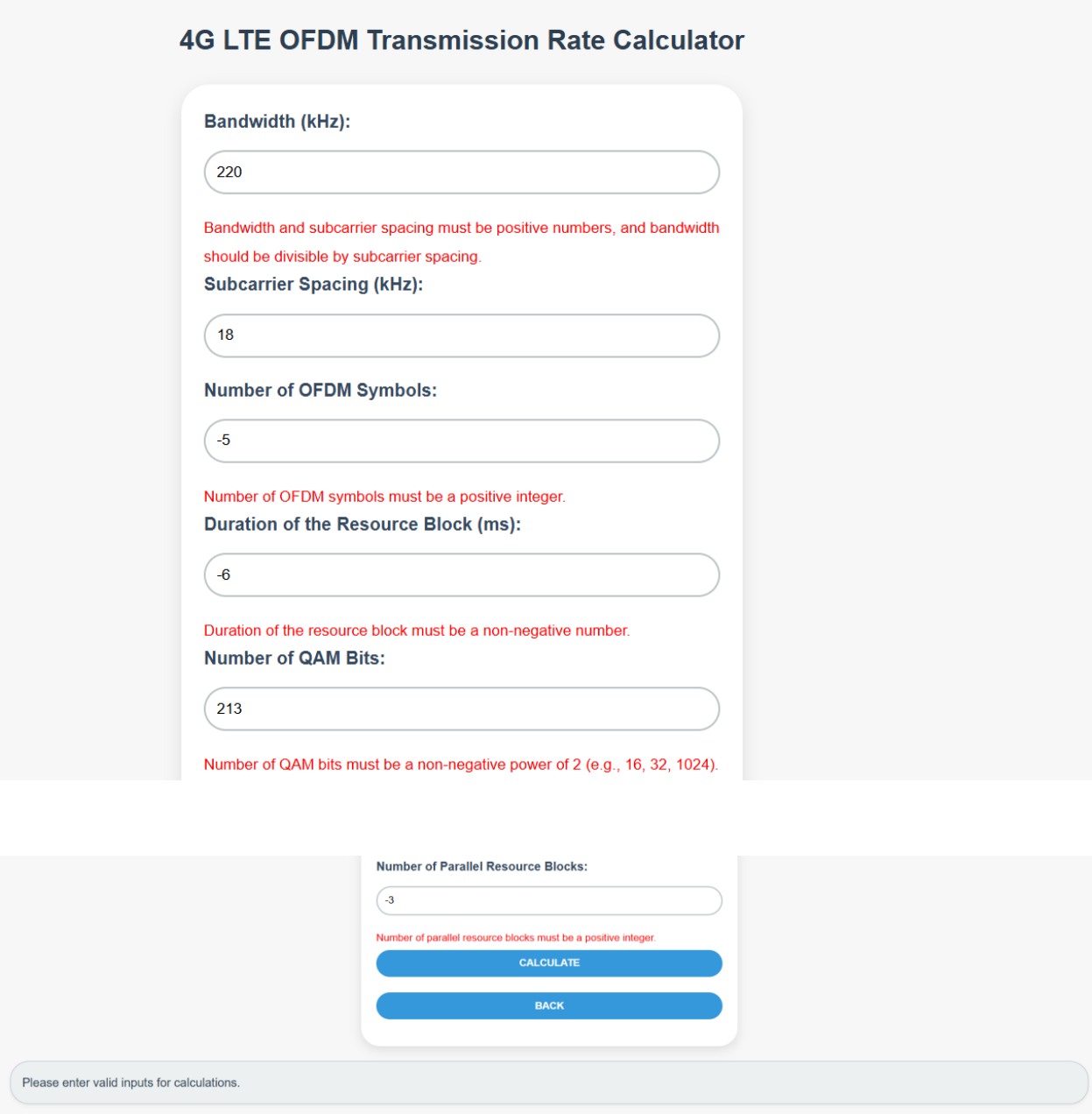
The Bit Rate at the Output of the Source Encoder = **28800** bits/s

The Bit Rate at the Output of the Channel Encoder = **48000** bits/s

The Bit Rate at the Output of the Interleaver =**48000** bits/s

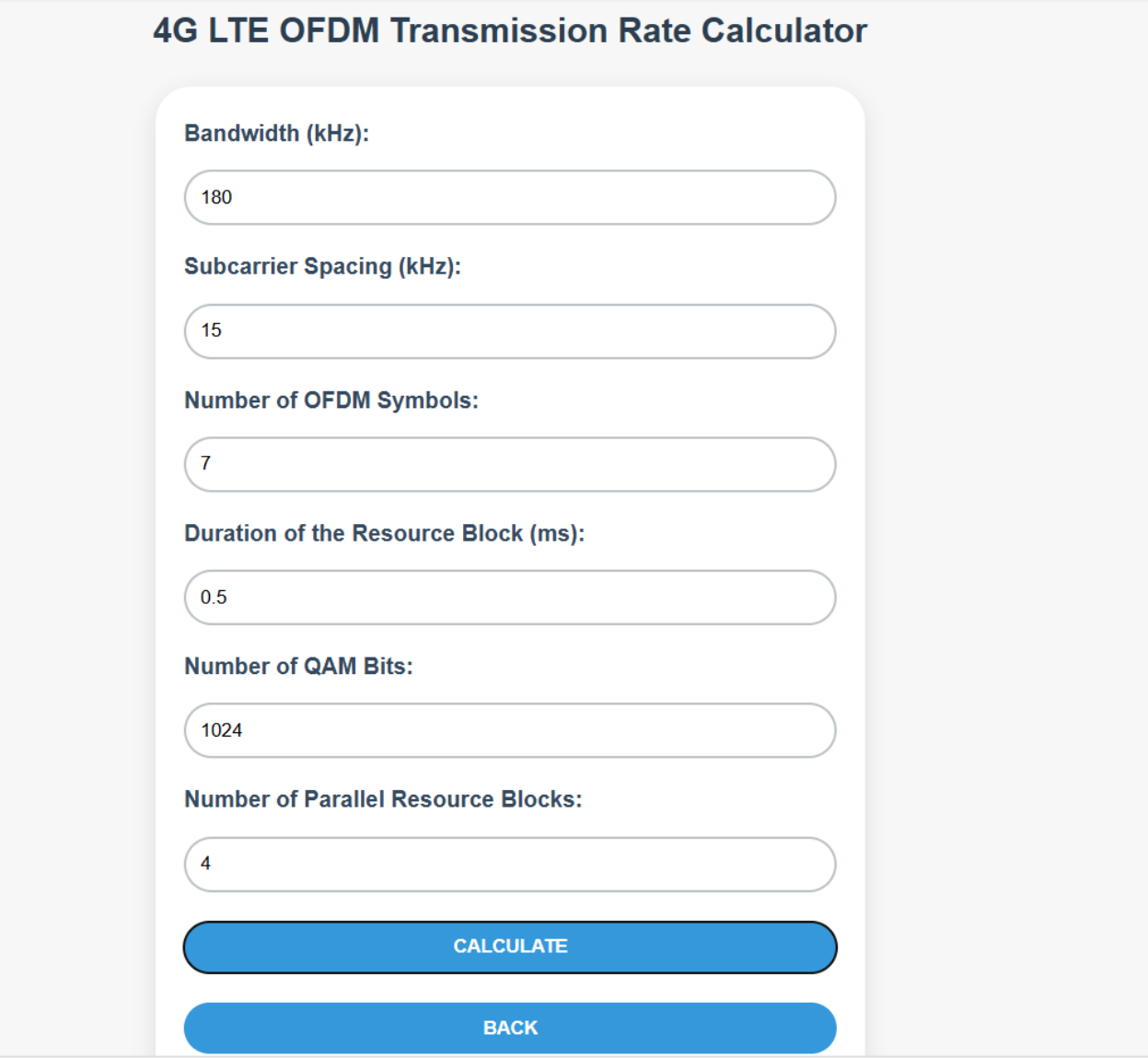
Application2

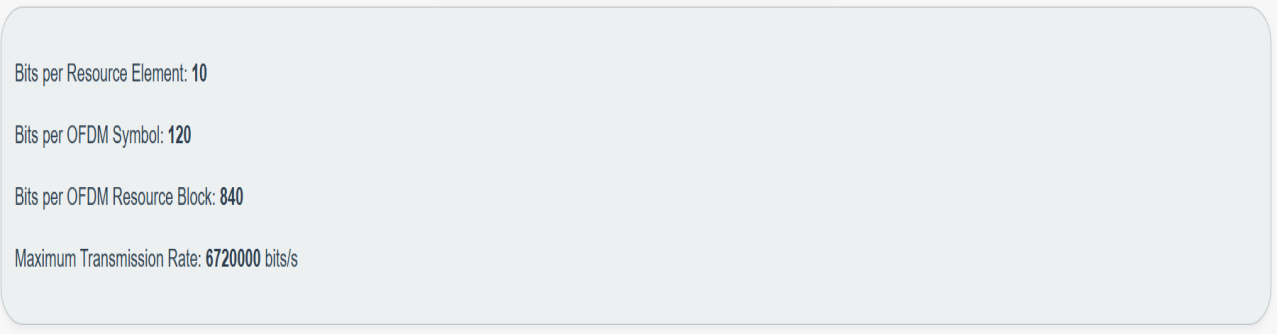
Validation



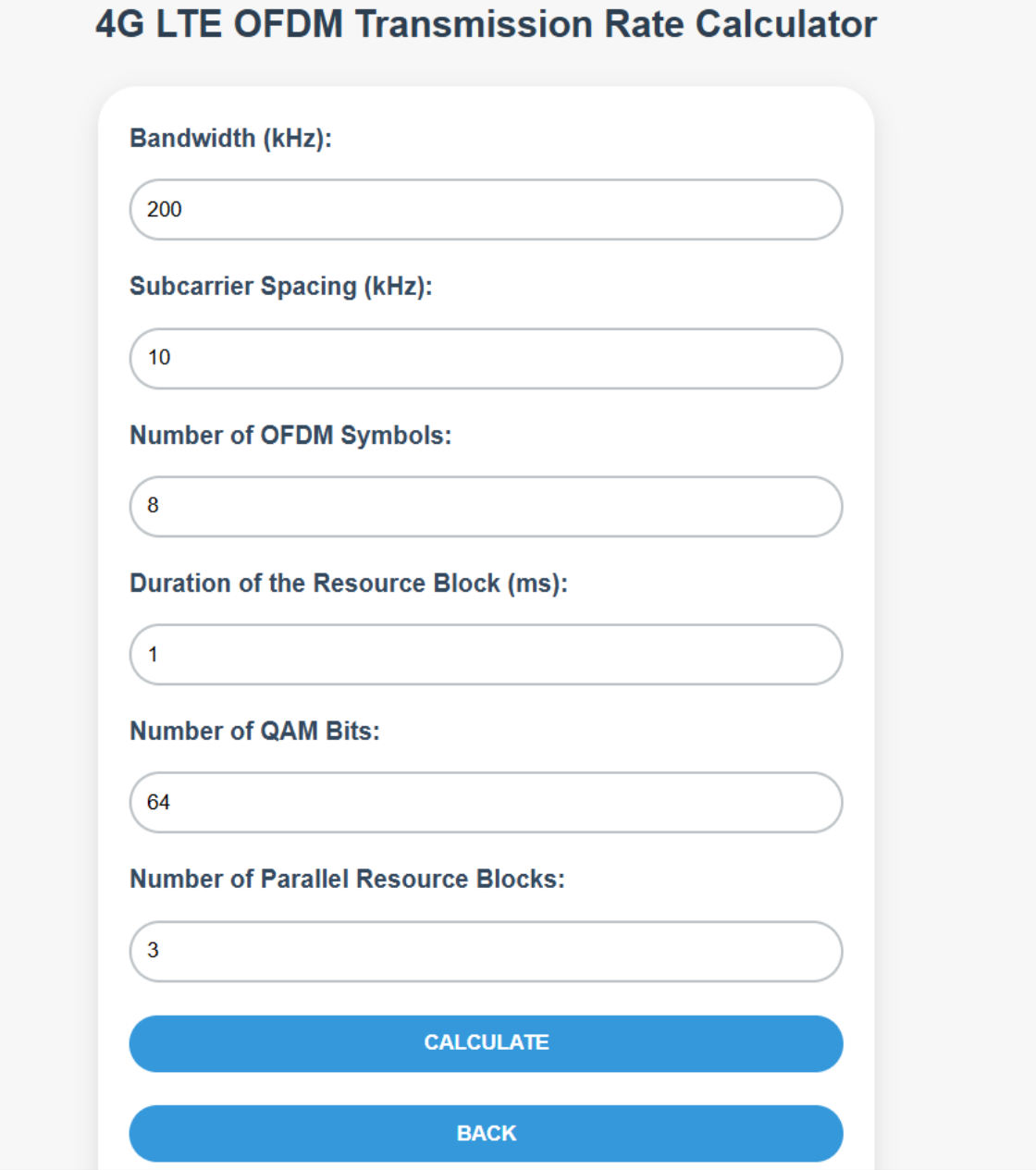
There is no output.

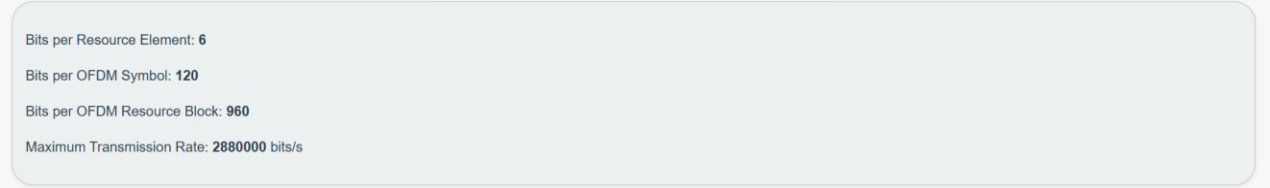
Scenario1 (midterm)



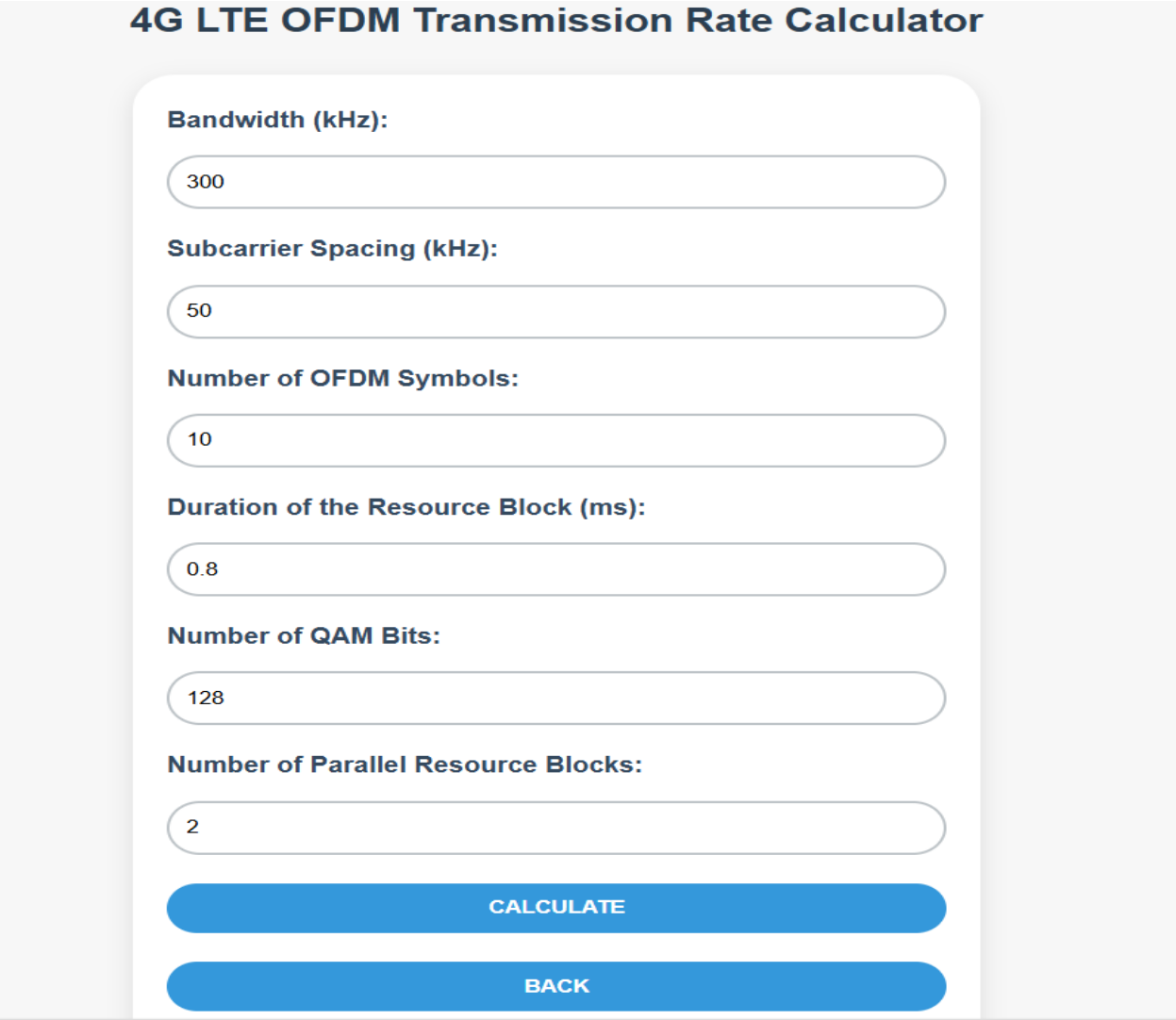


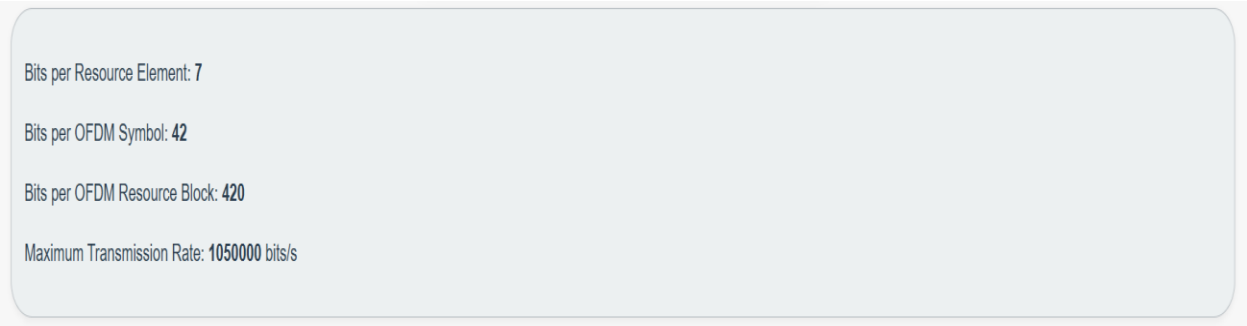
Scenario2


4G LTE OFDM Transmission Rate Calculator
Bandwidth (kHz):
200
Subcarrier Spacing (kHz):
10
Number of OFDM Symbols:
8
Duration of the Resource Block (ms):
1
Number of QAM Bits:
64
Number of Parallel Resource Blocks:
3
CALCULATE
BACK


Bits per Resource Element: 6
Bits per OFDM Symbol: 120
Bits per OFDM Resource Block: 960
Maximum Transmission Rate: 2880000 bits/s

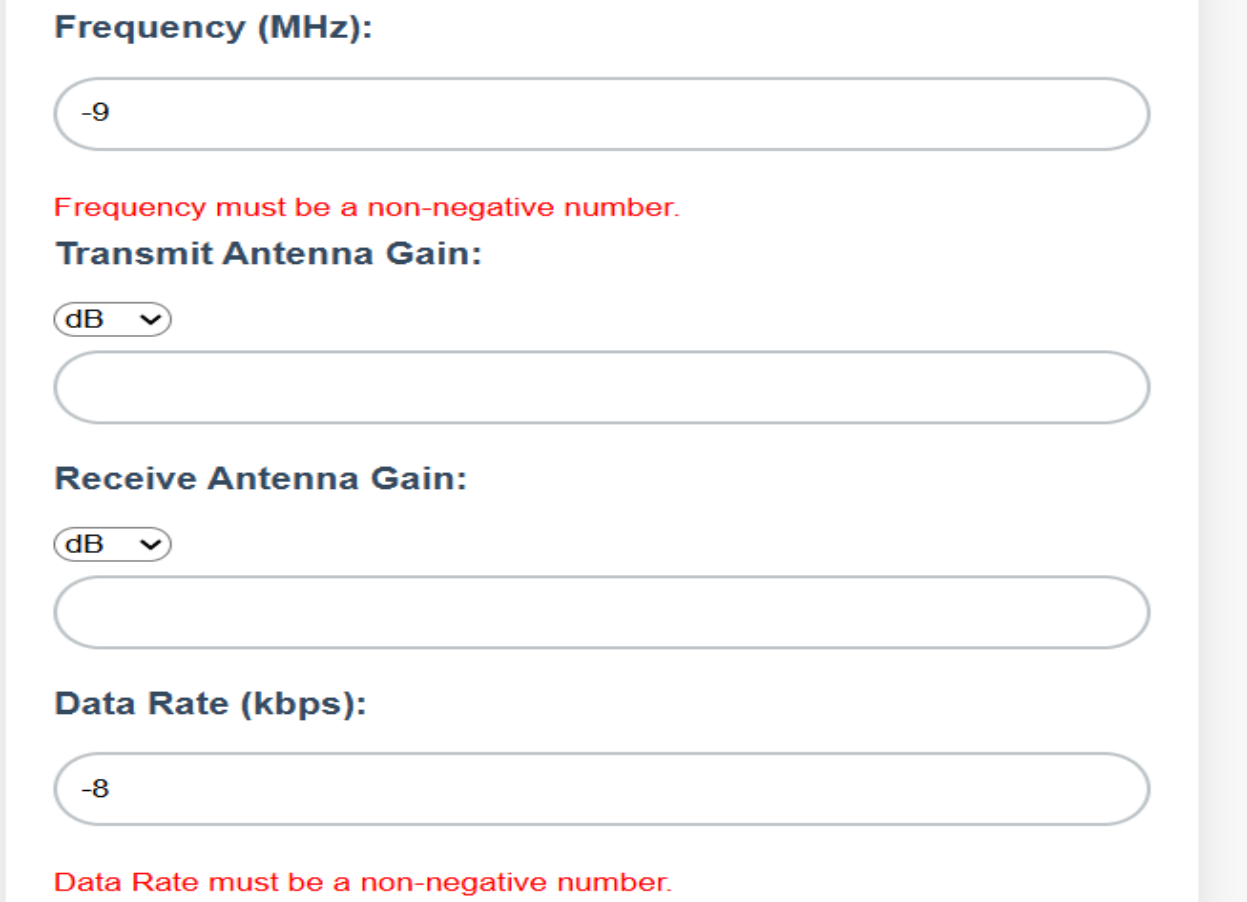
Scenario3


4G LTE OFDM Transmission Rate Calculator
Bandwidth (kHz):
300
Subcarrier Spacing (kHz):
50
Number of OFDM Symbols:
10
Duration of the Resource Block (ms):
0.8
Number of QAM Bits:
128
Number of Parallel Resource Blocks:
2
CALCULATE
BACK

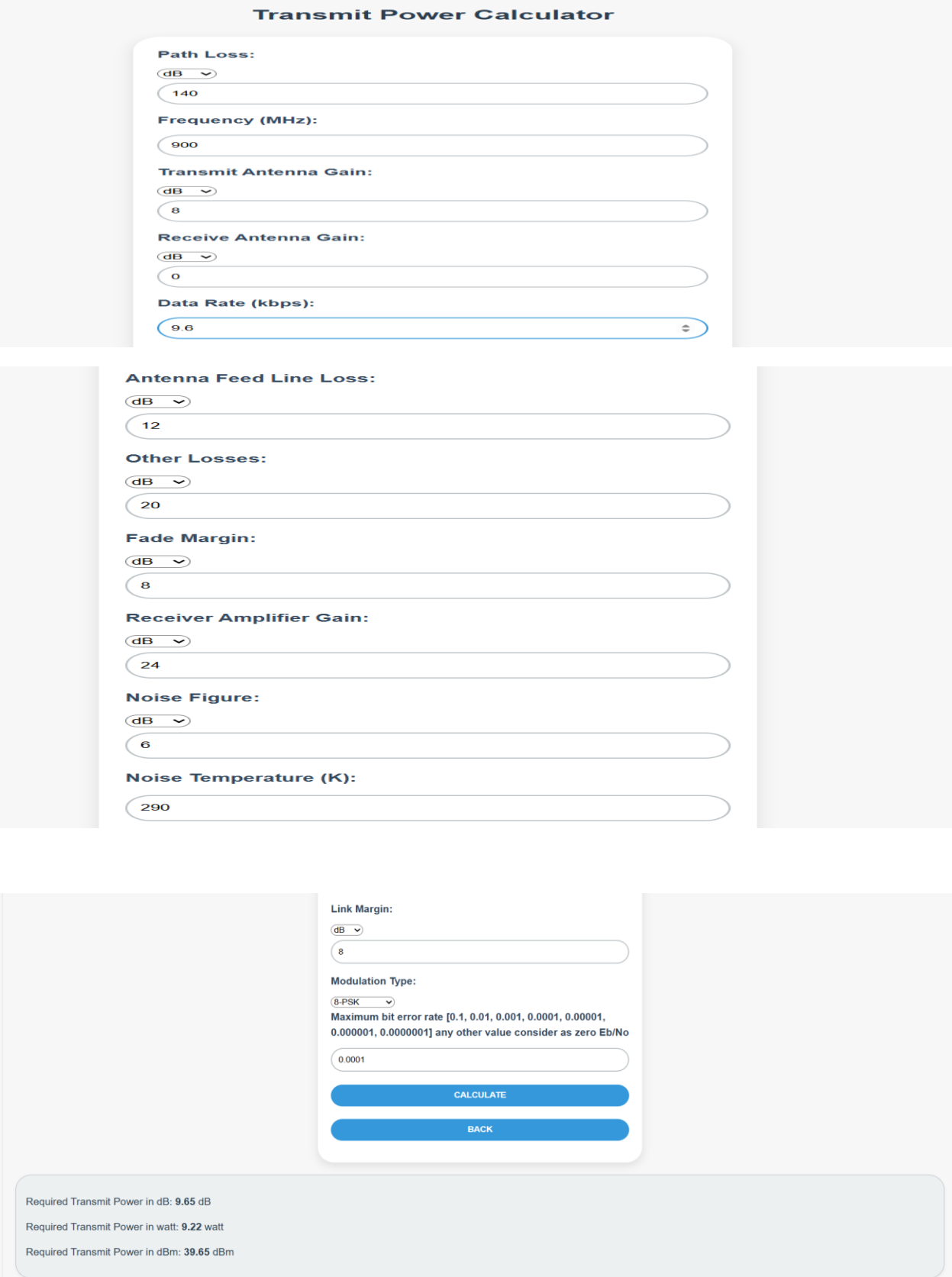

Bits per Resource Element: 7
Bits per OFDM Symbol: 42
Bits per OFDM Resource Block: 420
Maximum Transmission Rate: 1050000 bits/s

Application3

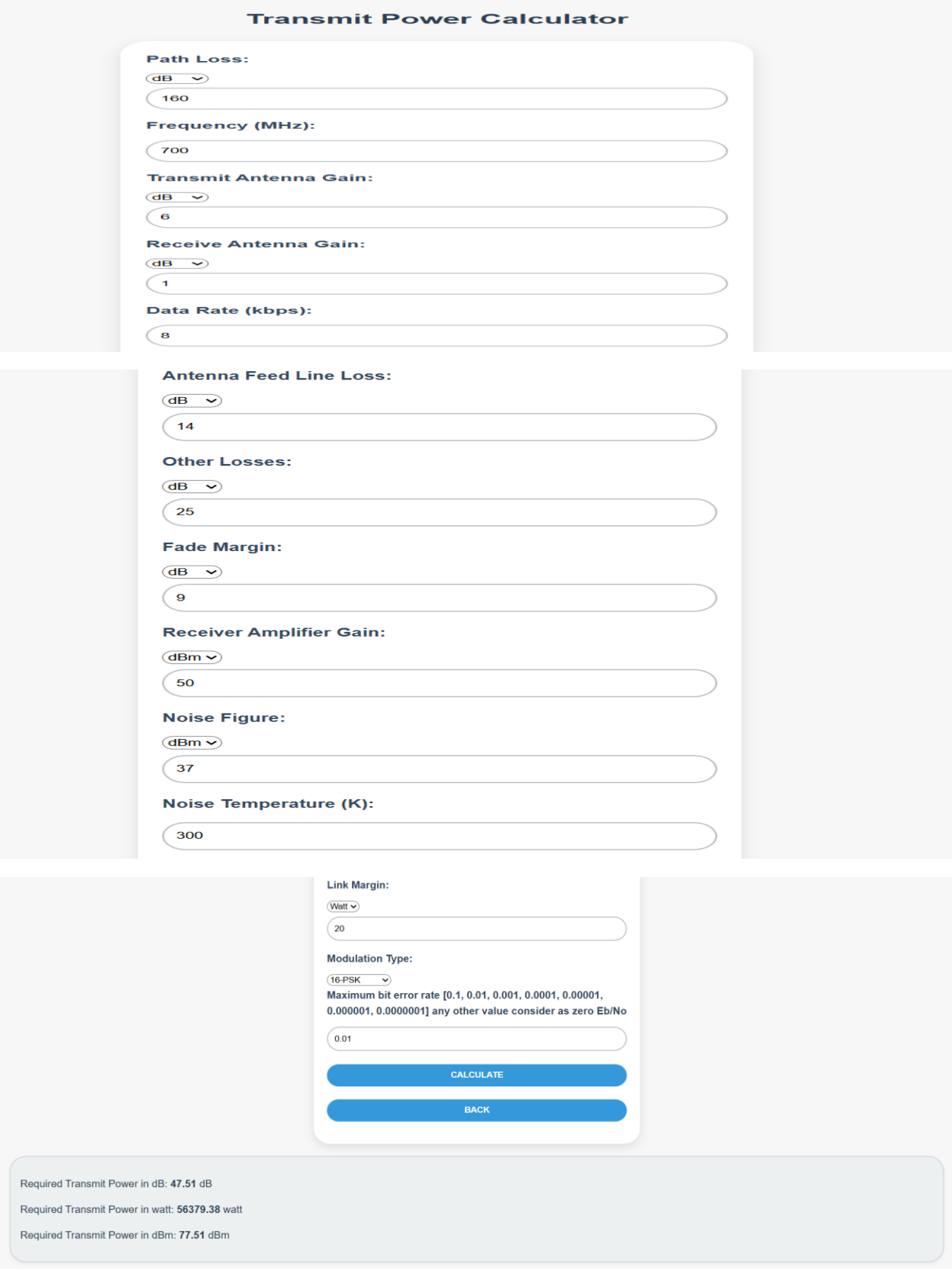
Validation



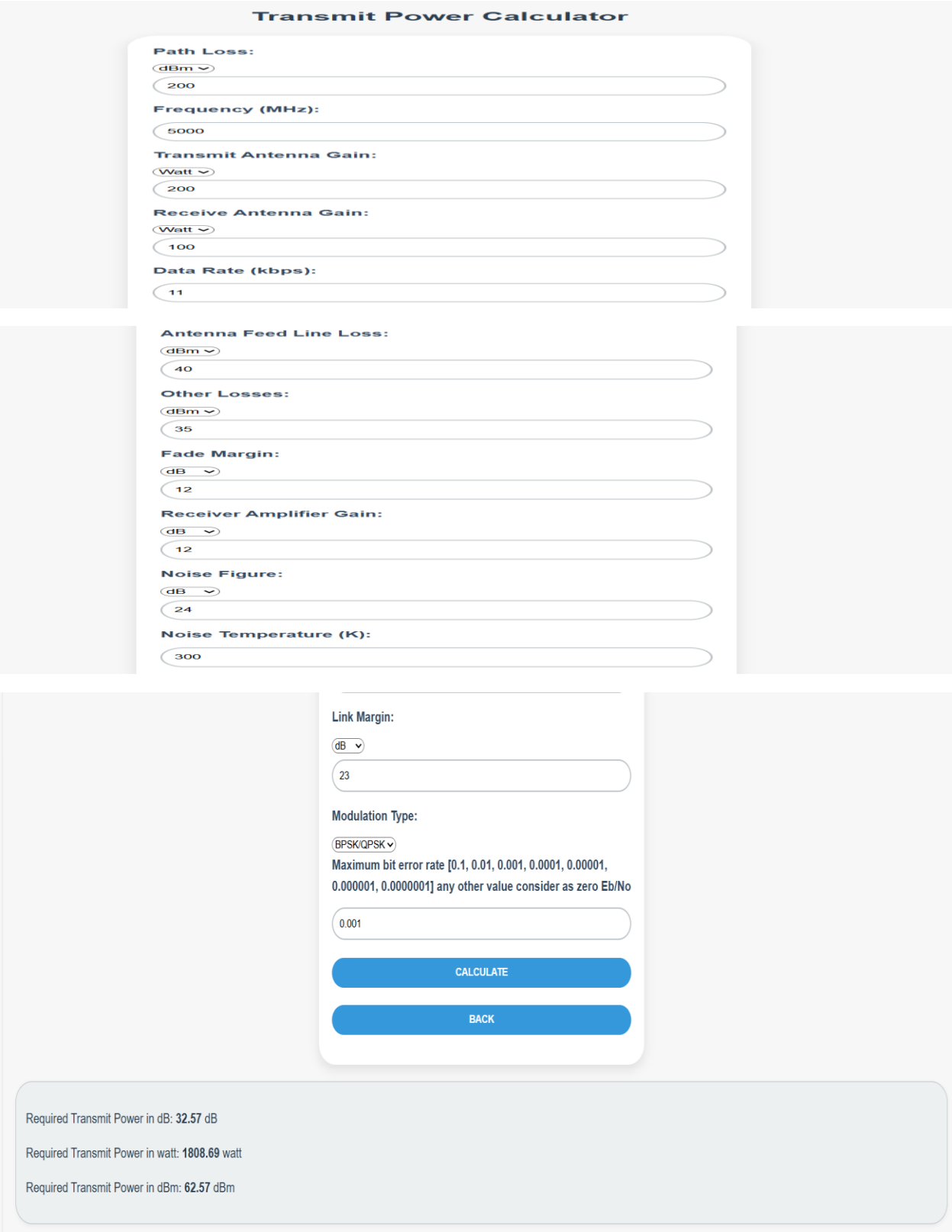
Scenario1 (midterm)



Scenario2

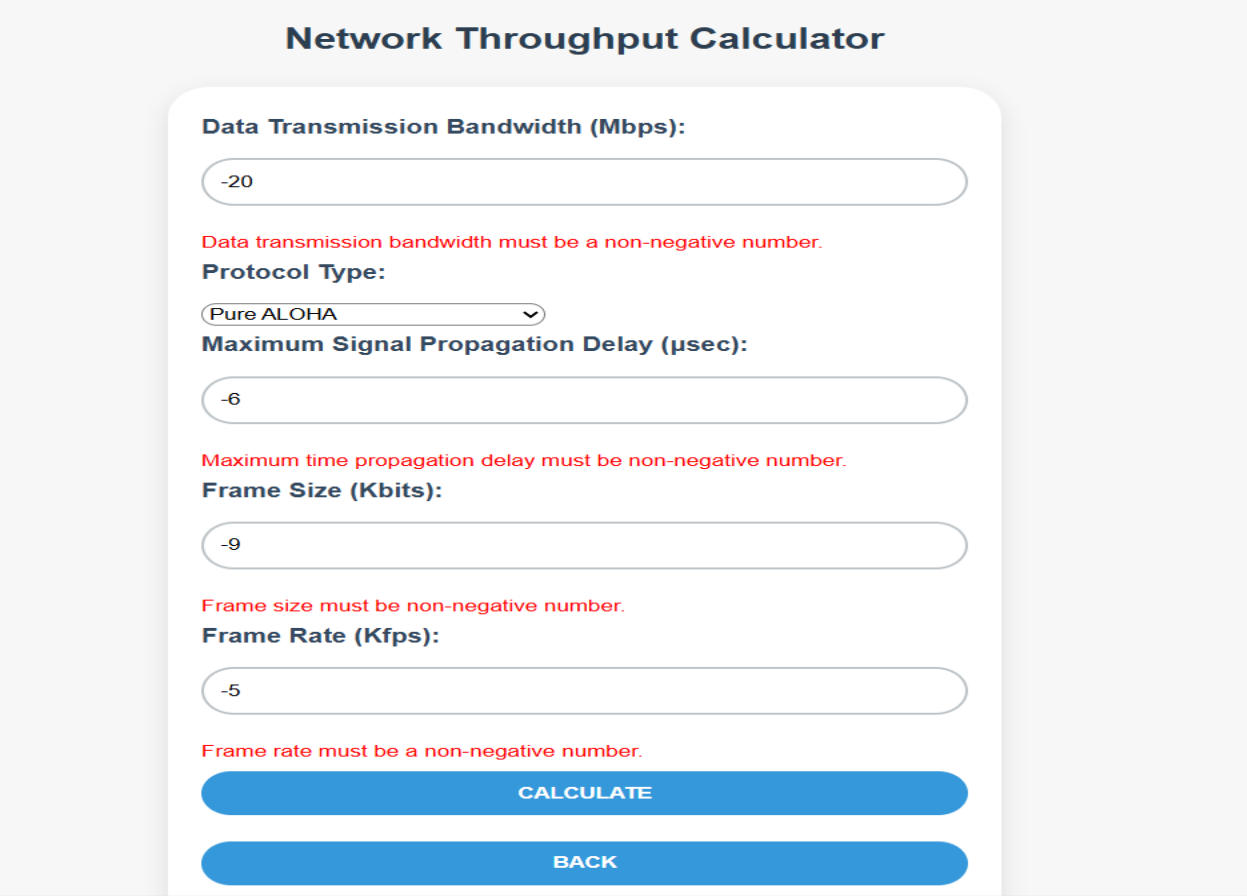

Transmit Power Calculator
Path Loss:
dB
160
Frequency (MHz):
700
Transmit Antenna Gain:
dB
6
Receive Antenna Gain:
dB
1
Data Rate (kbps):
8
Antenna Feed Line Loss:
dB
14
Other Losses:
dB
25
Fade Margin:
dB
9
Receiver Amplifier Gain:
dBm
50
Noise Figure:
dBm
37
Noise Temperature (K):
300
Link Margin:
Watt
20
Modulation Type:
16-PSK
Maximum bit error rate [0.1, 0.01, 0.001, 0.0001, 0.00001, 0.000001, 0.0000001] any other value consider as zero Eb/No
0.01
CALCULATE
BACK
Required Transmit Power in dB: 47.51 dB
Required Transmit Power in watt: 56379.38 watt
Required Transmit Power in dBm: 77.51 dBm

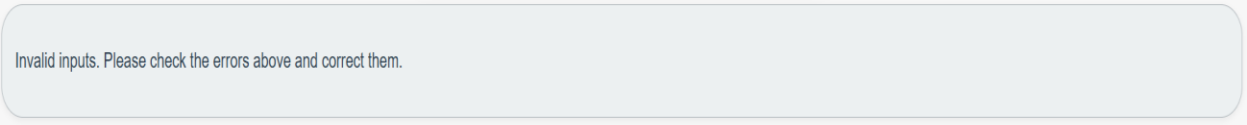
Scenario3


Transmit Power Calculator
Path Loss:
dBm
200
Frequency (MHz):
5000
Transmit Antenna Gain:
Watt
200
Receive Antenna Gain:
Watt
100
Data Rate (kbps):
11
Antenna Feed Line Loss:
dBm
40
Other Losses:
dBm
35
Fade Margin:
dB
12
Receiver Amplifier Gain:
dB
12
Noise Figure:
dB
24
Noise Temperature (K):
300
Link Margin:
dB
23
Modulation Type:
BPSK/QPSK
Maximum bit error rate [0.1, 0.01, 0.001, 0.0001, 0.00001, 0.000001, 0.0000001] any other value consider as zero Eb/No
0.001
CALCULATE
BACK
Required Transmit Power in dB: 32.57 dB
Required Transmit Power in watt: 1808.69 watt
Required Transmit Power in dBm: 62.57 dBm

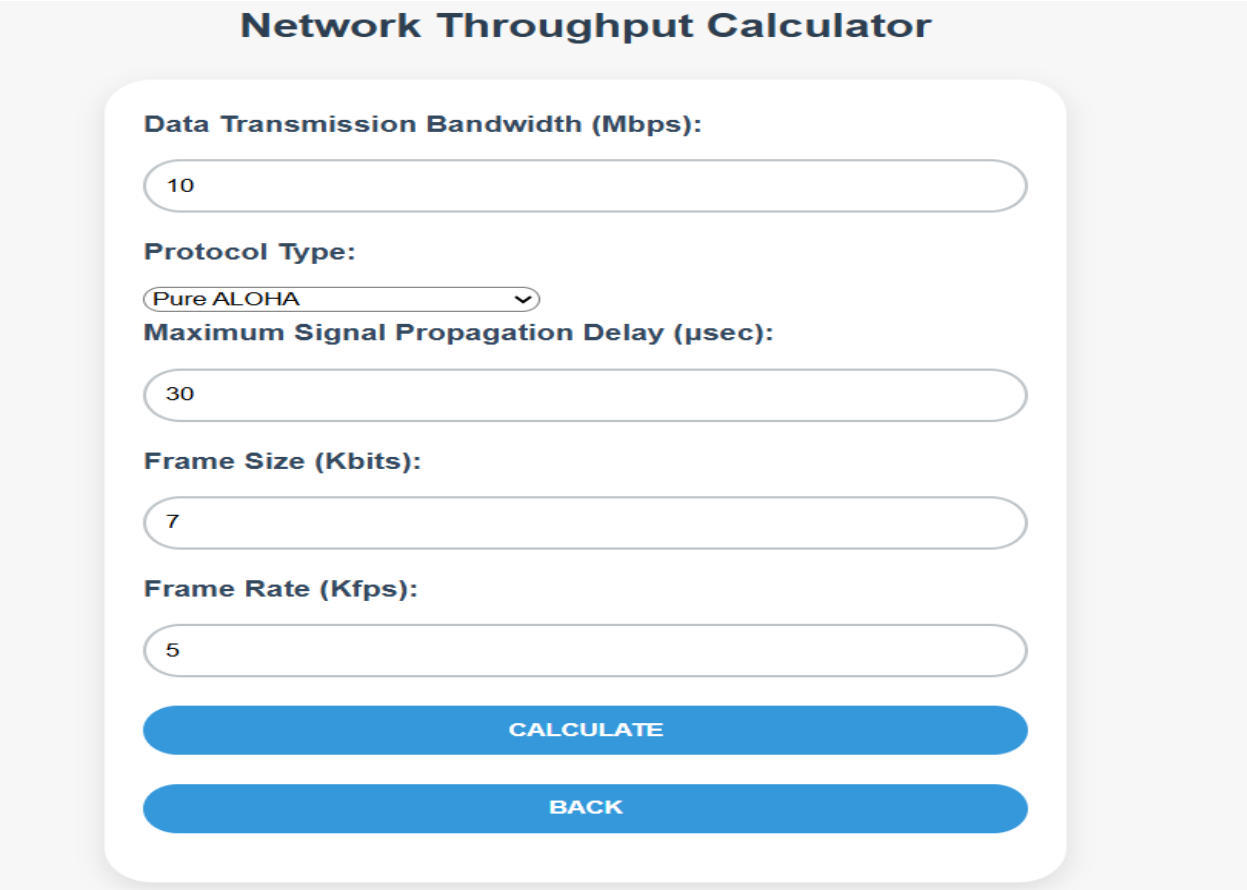
Appliation4

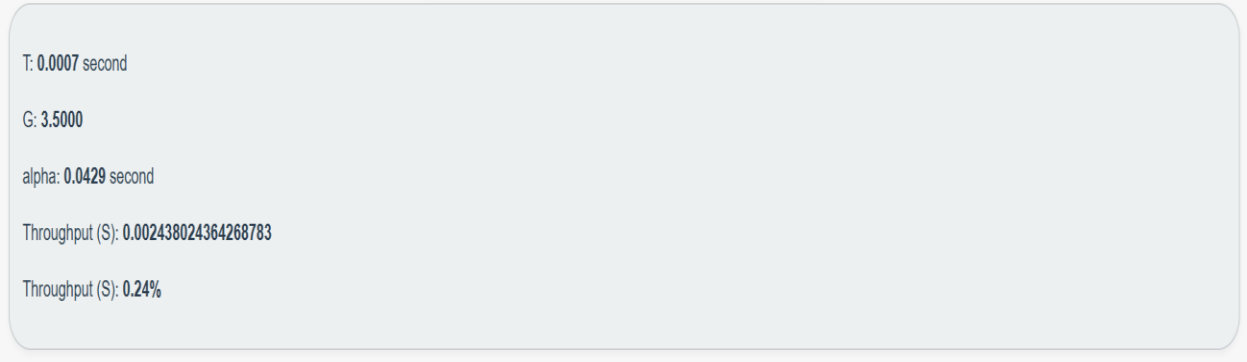
Validation



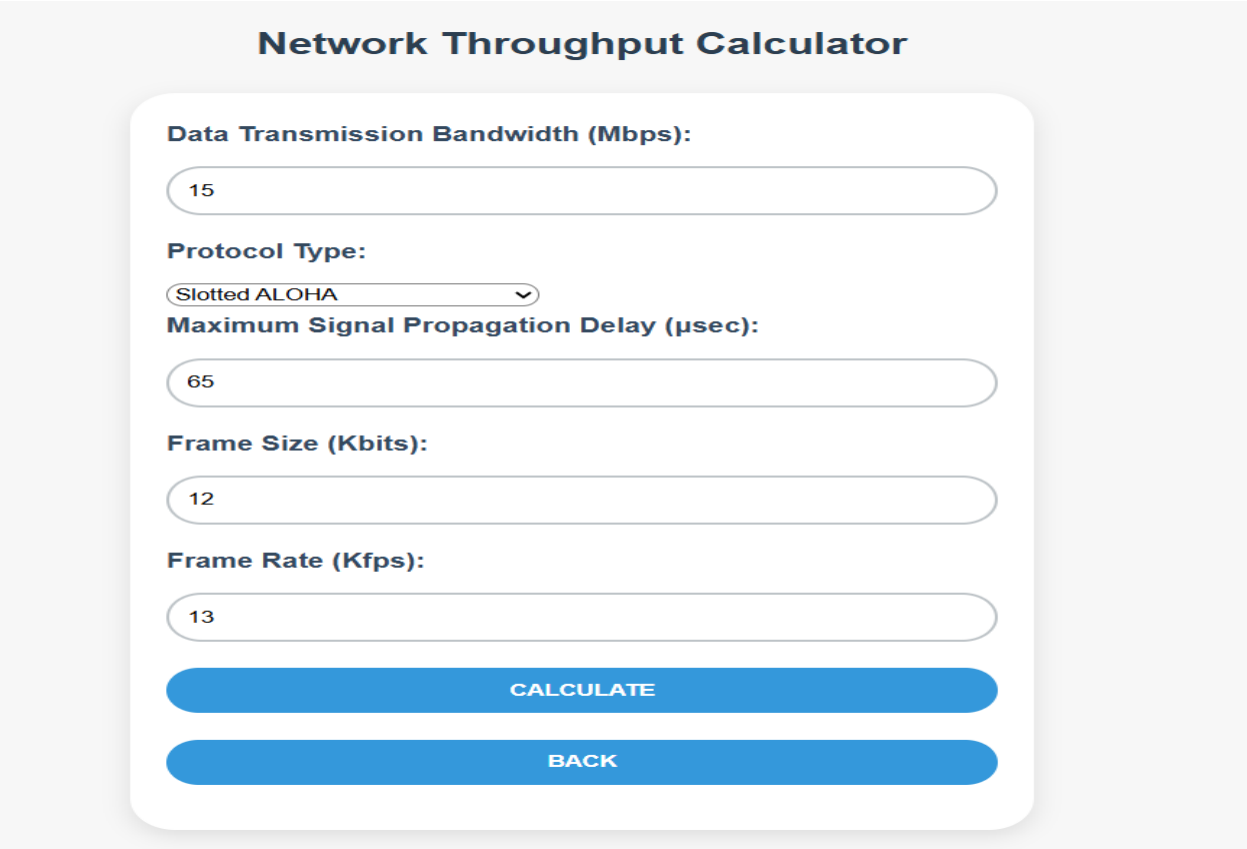


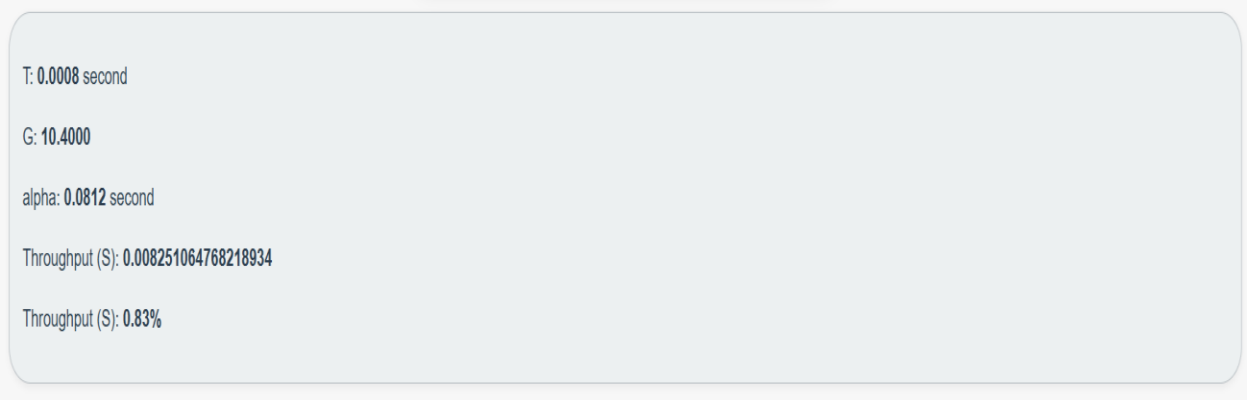
Scenario1: Pure ALOHA



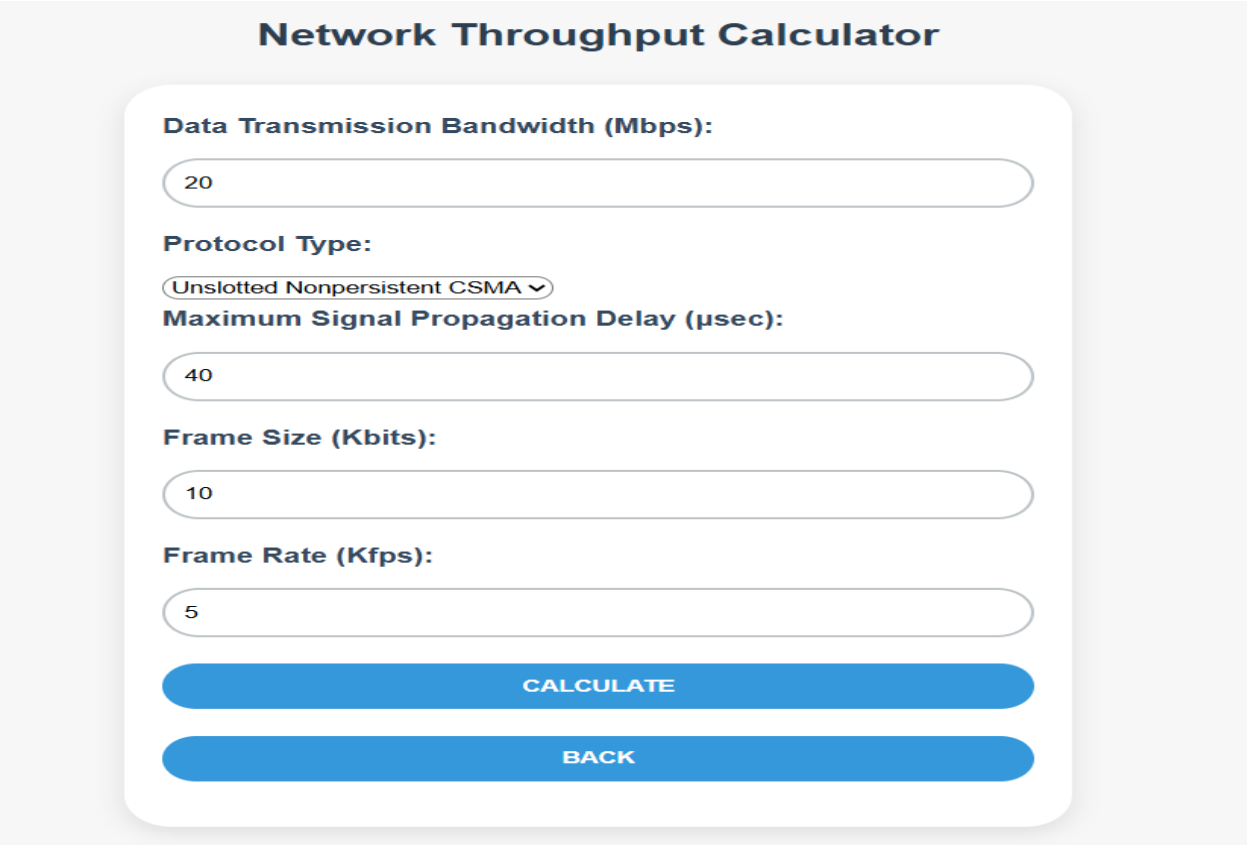


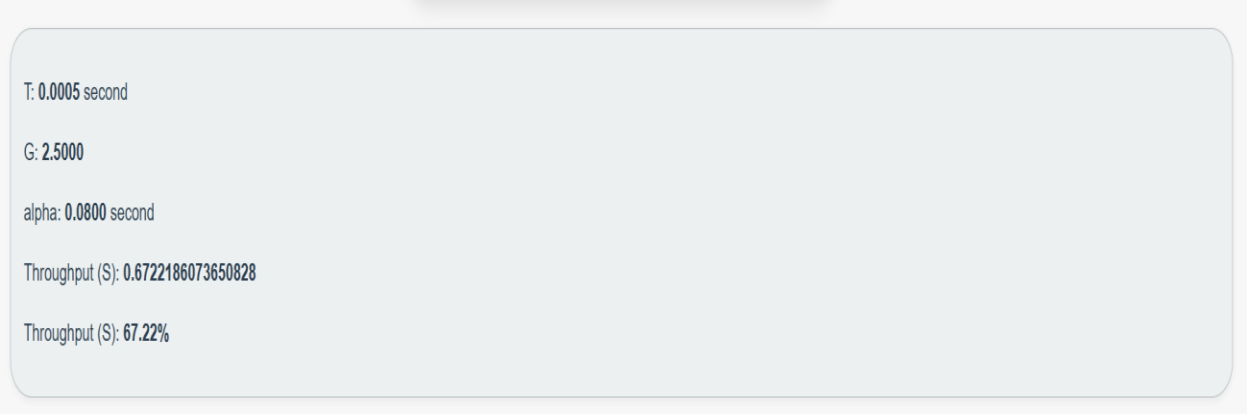
Scenario2: Slotted ALOHA



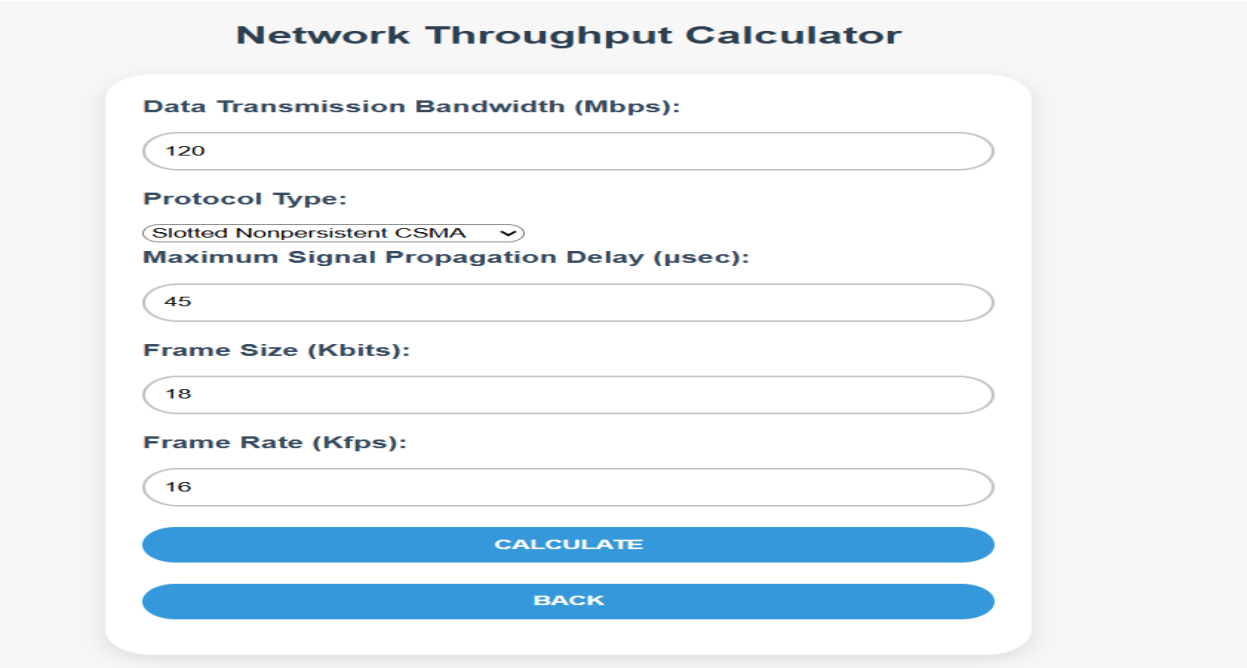


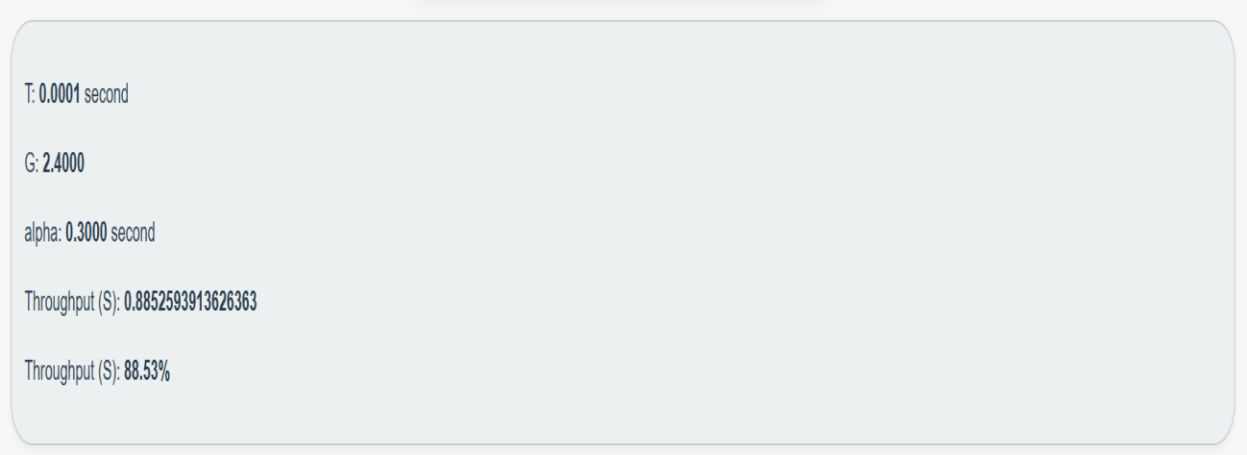
Scenario3: Unslotted Nonpersistent CSMA (midterm)



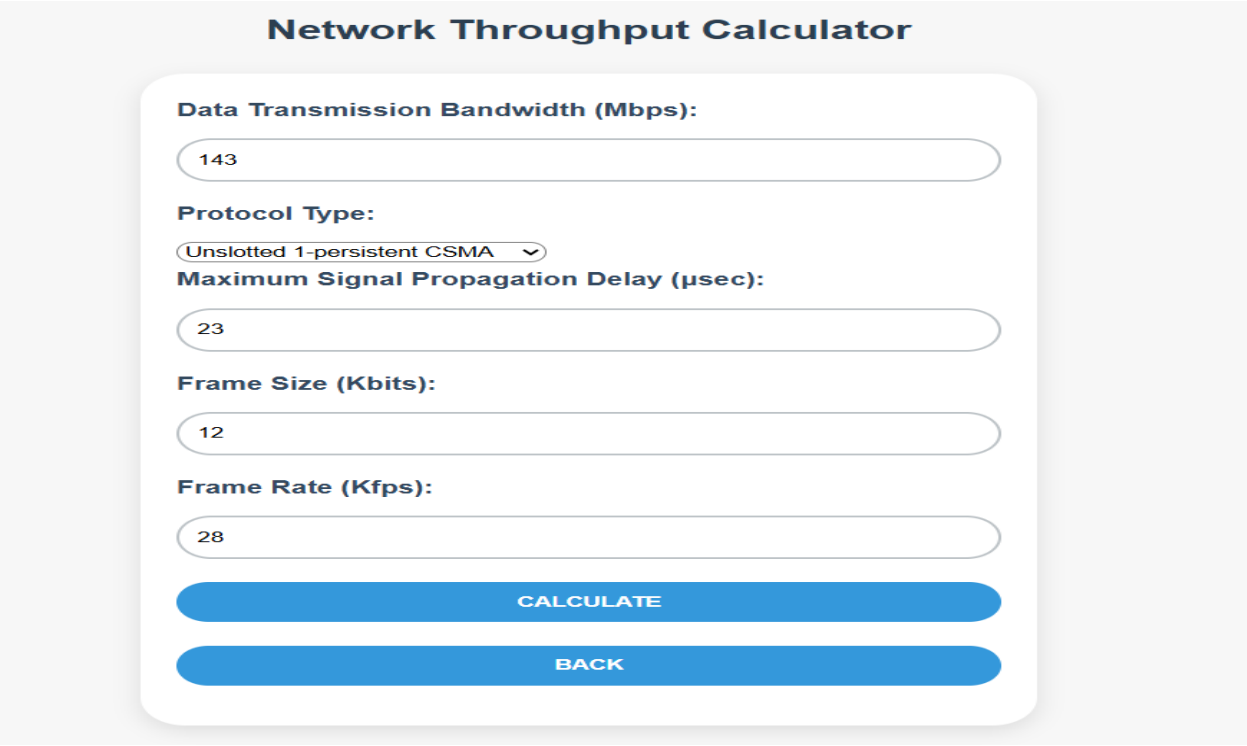


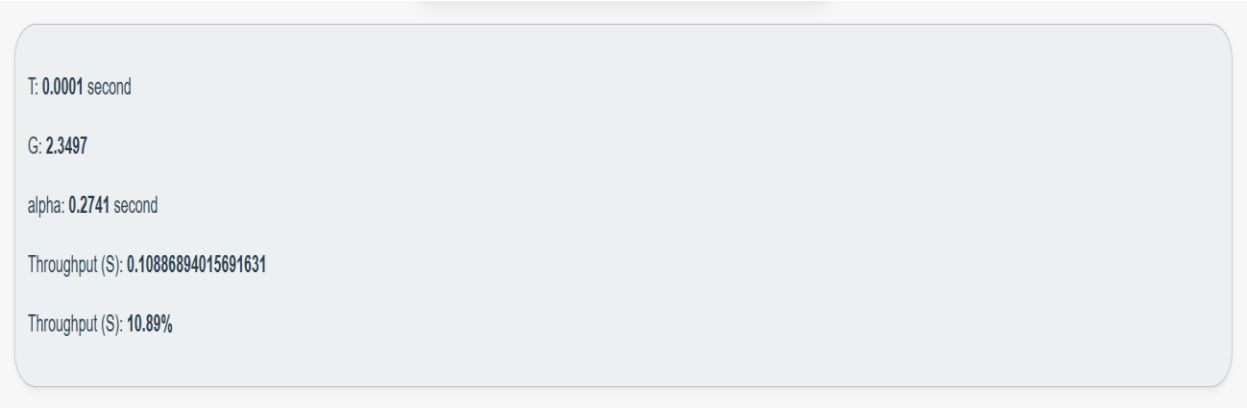
Scenario4: Slotted Nonpersistent CSMA



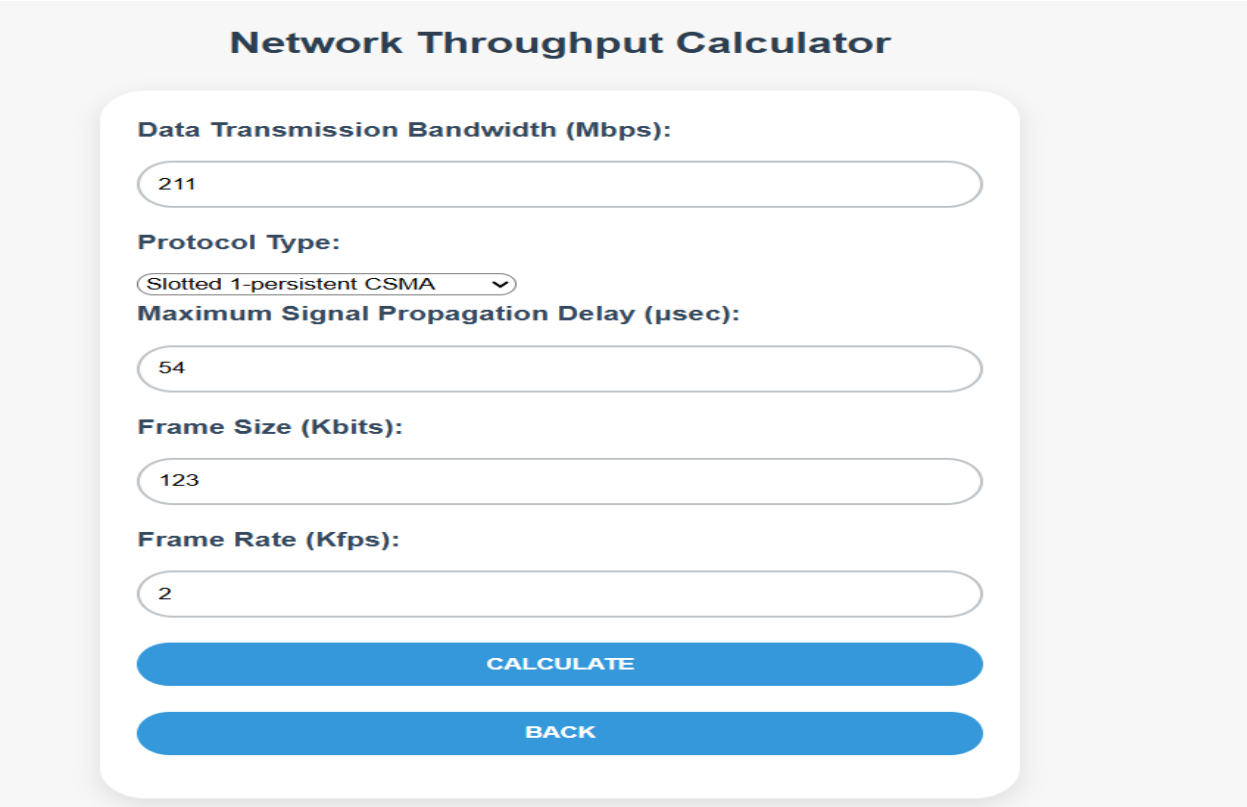


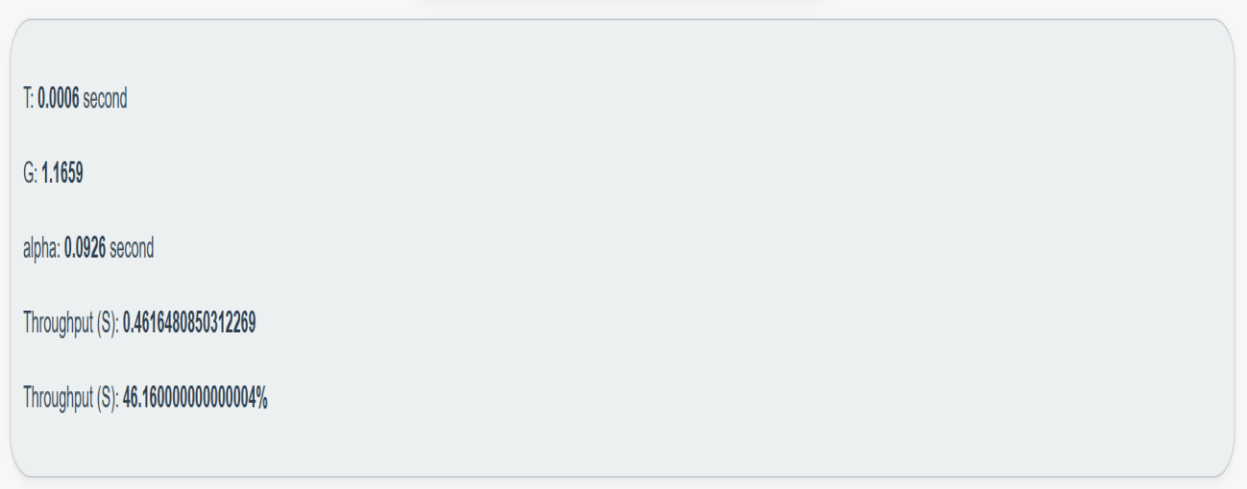
Scenario5: Unslotted 1-persistent CSMA





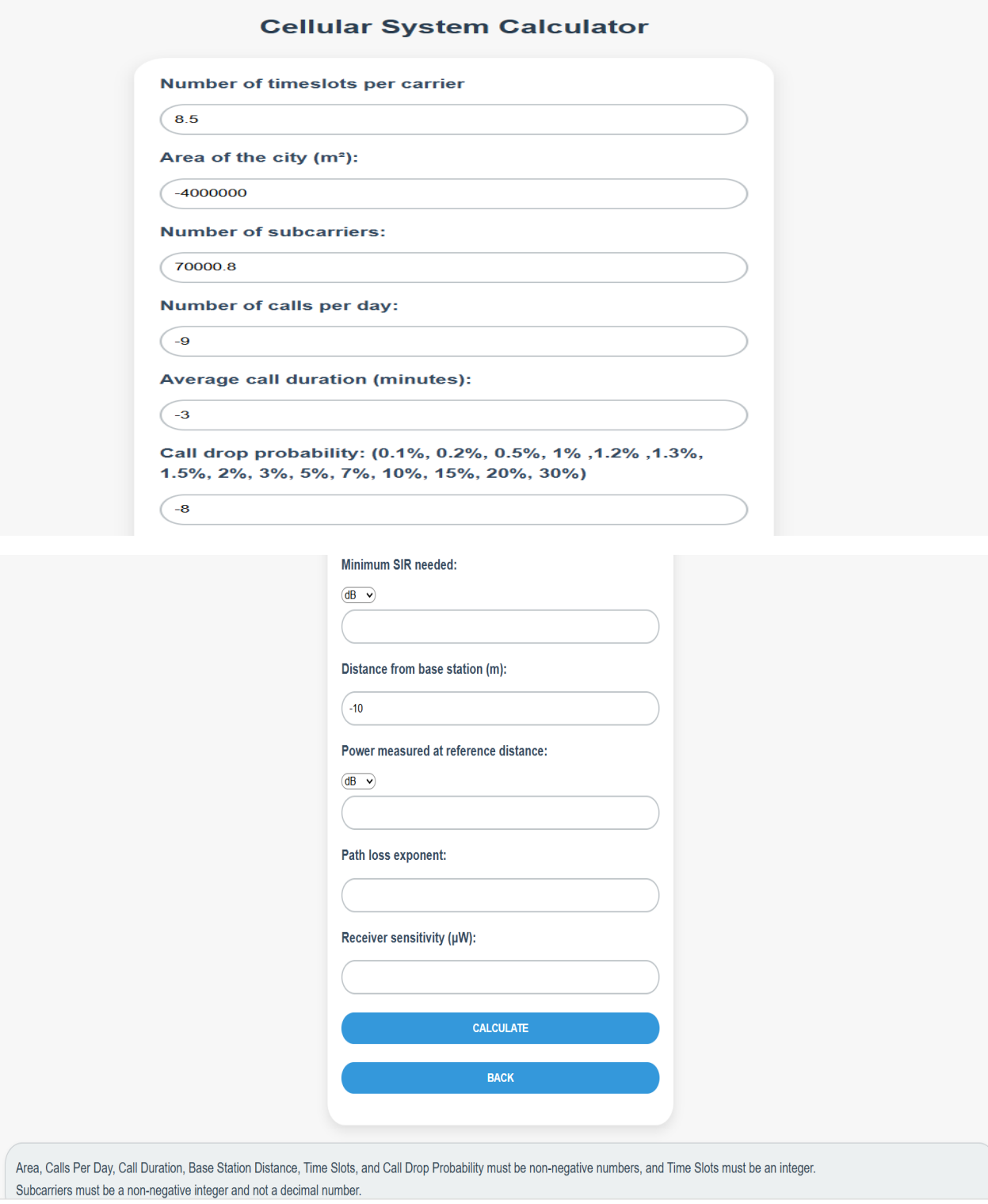
Scenario6: Slotted 1-persistent CSMA



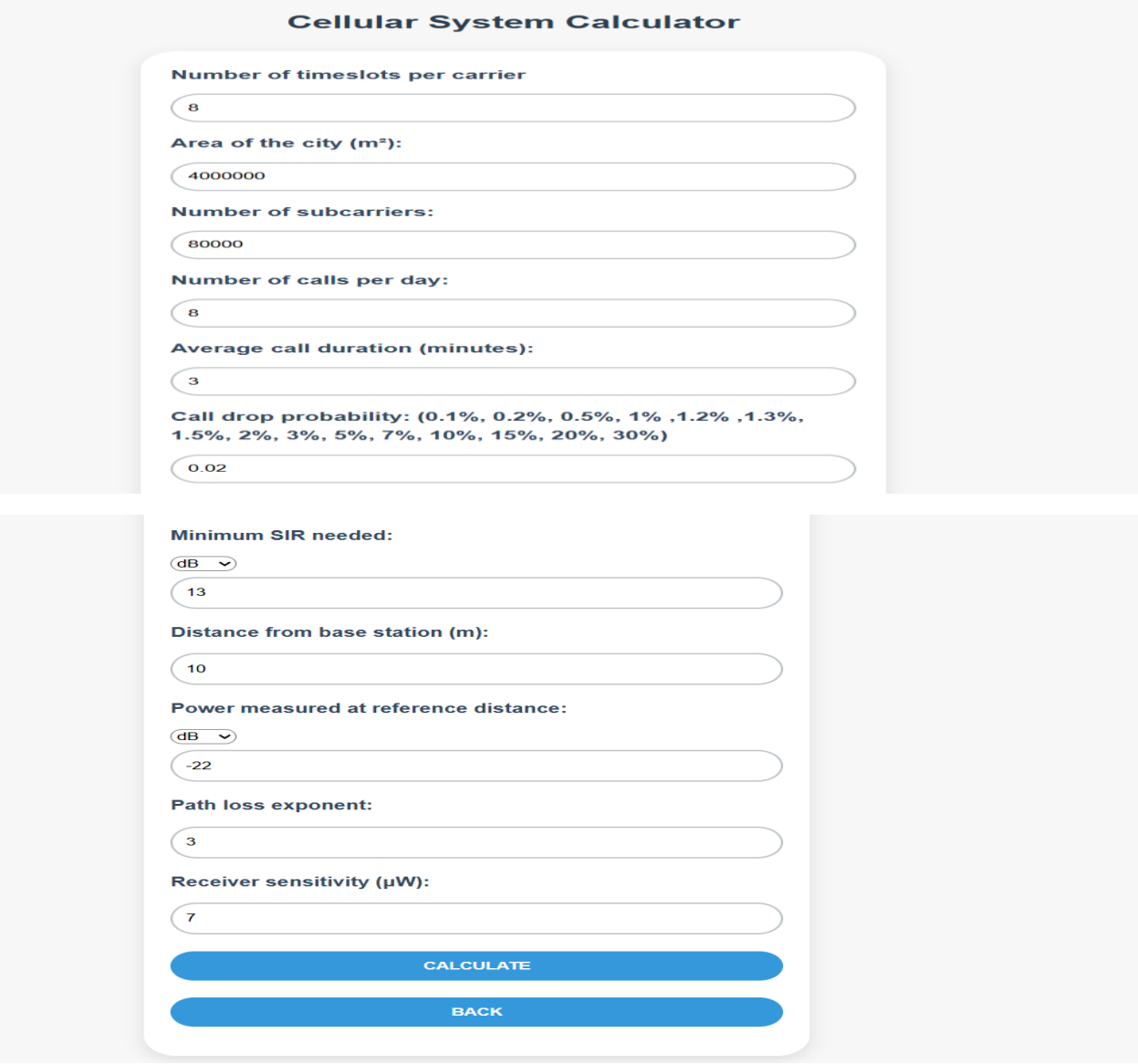


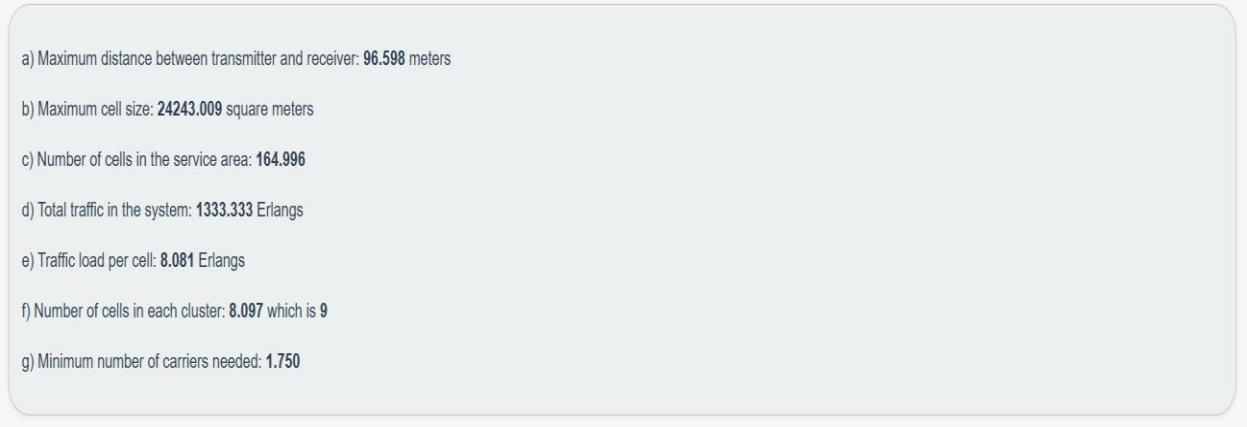
Application5

Validation

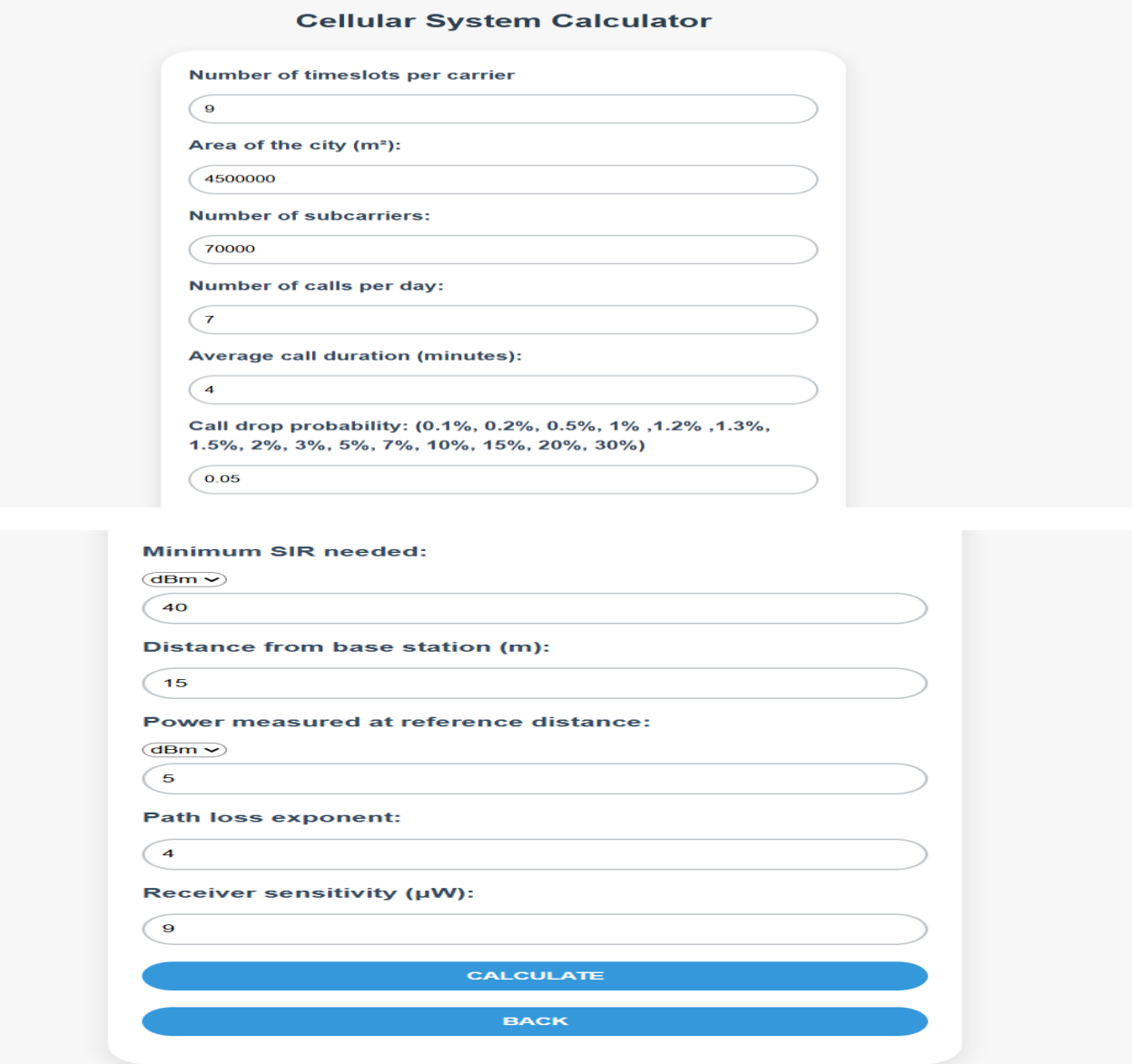


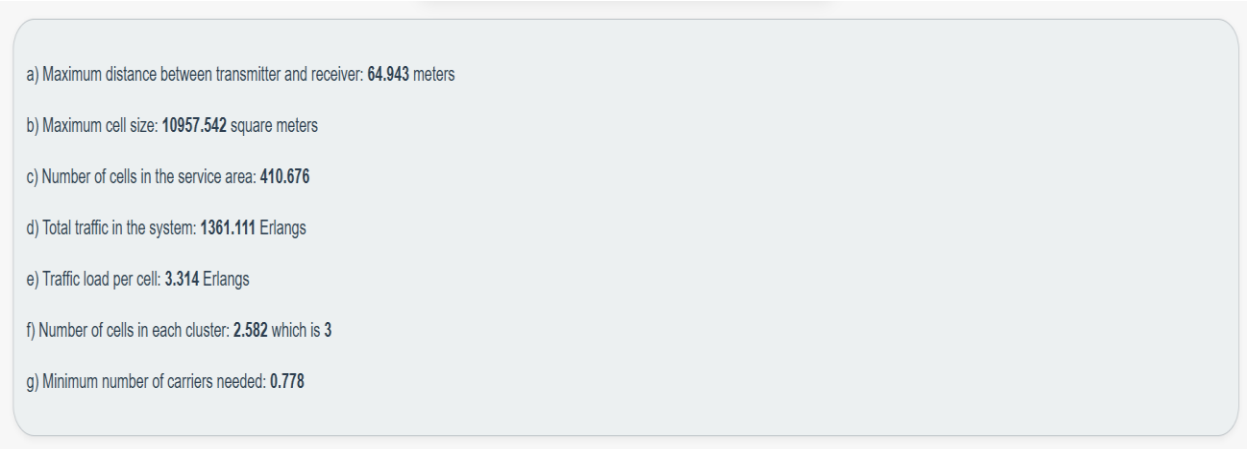
Scenario1 (worksheet2)



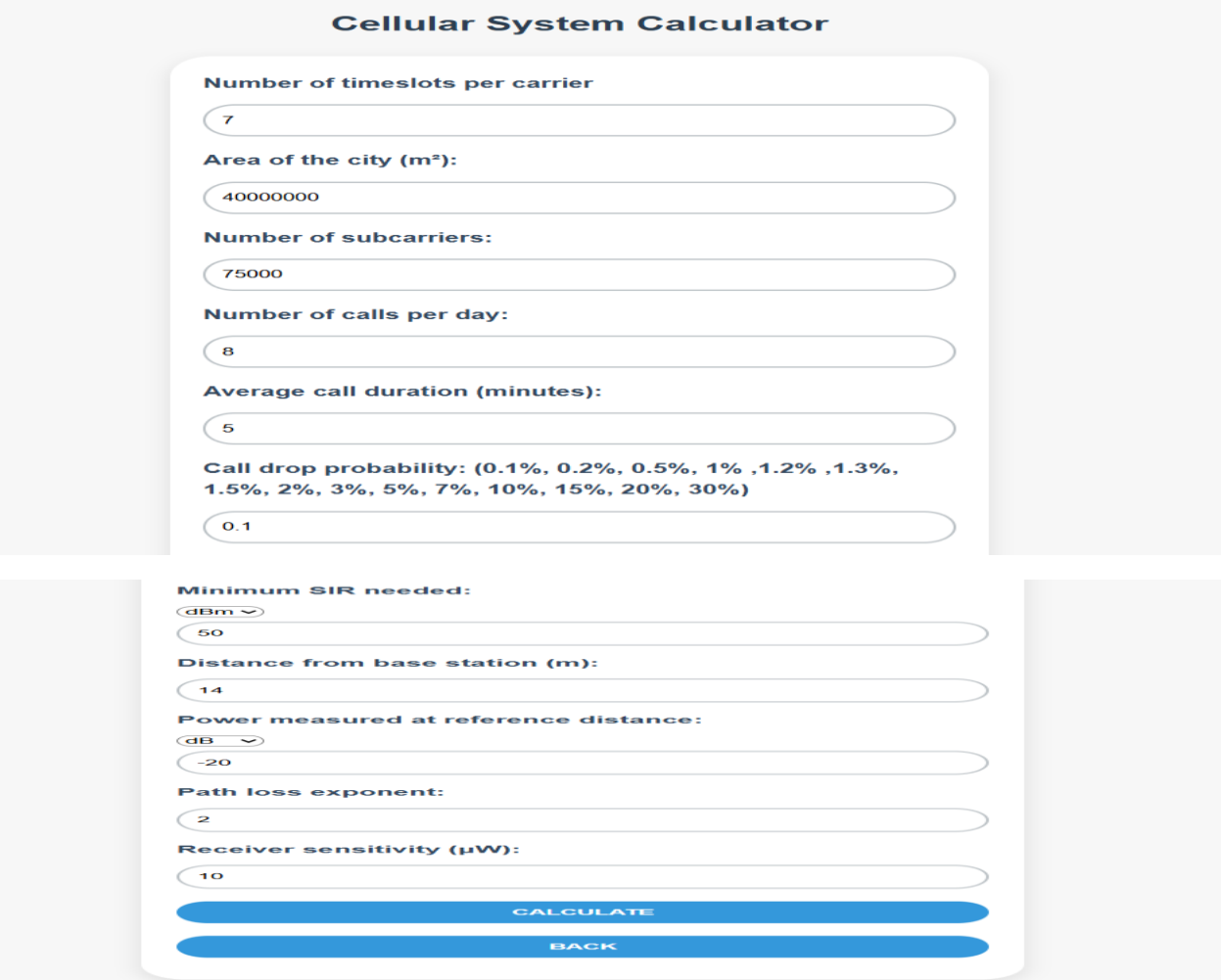


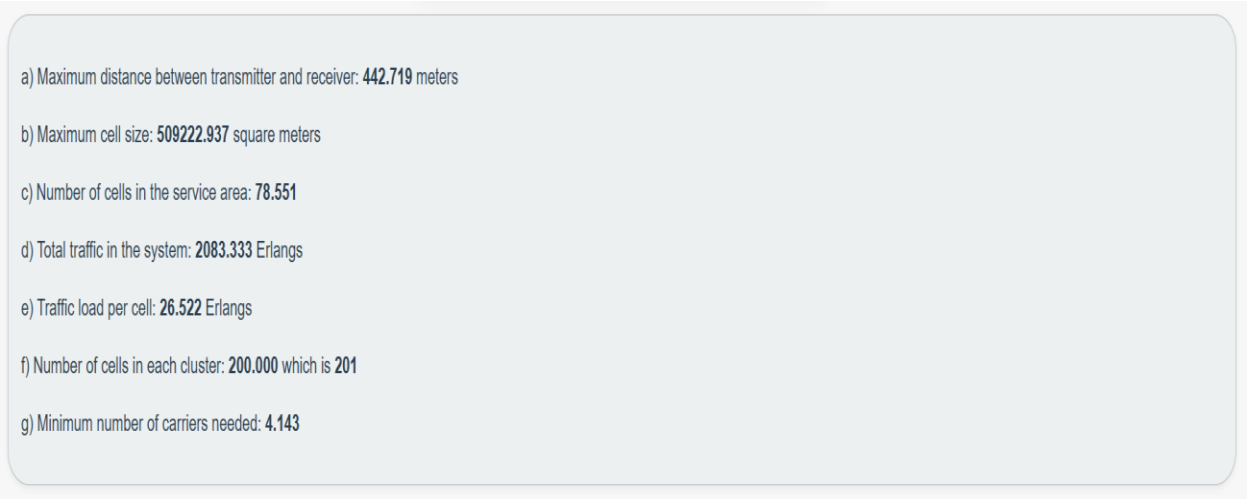
Scenario2


Cellular System Calculator
Number of timeslots per carrier
9
Area of the city (m²):
4500000
Number of subcarriers:
70000
Number of calls per day:
7
Average call duration (minutes):
4
Call drop probability: (0.1%, 0.2%, 0.5%, 1% ,1.2% ,1.3%, 1.5%, 2%, 3%, 5%, 7%, 10%, 15%, 20%, 30%)
0.05
Minimum SIR needed:
dBm
40
Distance from base station (m):
15
Power measured at reference distance:
dBm
5
Path loss exponent:
4
Receiver sensitivity (μW):
9
CALCULATE
BACK


a) Maximum distance between transmitter and receiver: 64.943 meters
b) Maximum cell size: 10957.542 square meters
c) Number of cells in the service area: 410.676
d) Total traffic in the system: 1361.111 Erlangs
e) Traffic load per cell: 3.314 Erlangs
f) Number of cells in each cluster: 2.582 which is 3
g) Minimum number of carriers needed: 0.778

Scenario3


Cellular System Calculator
Number of timeslots per carrier
7
Area of the city (m²):
40000000
Number of subcarriers:
75000
Number of calls per day:
8
Average call duration (minutes):
5
Call drop probability: (0.1%, 0.2%, 0.5%, 1% ,1.2% ,1.3%, 1.5%, 2%, 3%, 5%, 7%, 10%, 15%, 20%, 30%)
0.1
Minimum SIR needed:
dBm
50
Distance from base station (m):
14
Power measured at reference distance:
dB
-20
Path loss exponent:
2
Receiver sensitivity (µW):
10
CALCULATE
BACK


a) Maximum distance between transmitter and receiver: 442.719 meters
b) Maximum cell size: 509222.937 square meters
c) Number of cells in the service area: 78.551
d) Total traffic in the system: 2083.333 Erlangs
e) Traffic load per cell: 26.522 Erlangs
f) Number of cells in each cluster: 200.000 which is 201
g) Minimum number of carriers needed: 4.143

GitHub Link

Main Page (mohammadabushams02.github.io)