

(20, 0)

With BF.

```
SAT index: 0
Q1: Euclidean distance: 1200009.000000 m
Q2: pathloss: 157.553298 dBm
Q3: RxPower: -56.813298 dBm
Q4: SNR: 53.186702 dB
Q4: datarate: 35.336494 Mbps
Packet average end-to-end delay is 0.0101597s
```

Without BF. (using Shannon capacity as datarate)

```
SAT index: 0
Q1: Euclidean distance: 1200009.000000 m
Q2: pathloss: 181.635698 dBm
Q3: RxPower: -80.895698 dBm
Q4: SNR: 29.104302 dB
Q4: datarate: 19.340024 Mbps
Packet average end-to-end delay is 0.0102812s
```

Using datarate=8kbps

```
Packet average end-to-end delay is 0.718011s
```

(6.06692, 73.0213)

With BF.

```
SAT index: 1
Q1: Euclidean distance: 1200009.000003 m
Q2: pathloss: 157.555847 dBm
Q3: RxPower: -56.815847 dBm
Q4: SNR: 53.184153 dB
Q4: datarate: 35.334800 Mbps
Packet average end-to-end delay is 0.0103656s
```

Without BF. (using Shannon capacity as datarate)

```
SAT index: 1
Q1: Euclidean distance: 1200009.000003 m
Q2: pathloss: 181.635698 dBm
Q3: RxPower: -80.895698 dBm
Q4: SNR: 29.104302 dB
Q4: datarate: 19.340024 Mbps
Packet average end-to-end delay is 0.0104871s
```

Using datarate=8kbps

```
Packet average end-to-end delay is 0.718201s
```

(-16.0634, 142.29)

With BF.

```
SAT index: 2
Q1: Euclidean distance: 1200009.000114 m
Q2: pathloss: 157.573122 dBm
Q3: RxPower: -56.833122 dBm
Q4: SNR: 53.166878 dB
Q4: datarate: 35.323323 Mbps
Packet average end-to-end delay is 0.0101598s
```

Without BF. (using Shannon capacity as datarate)

```
SAT index: 2
Q1: Euclidean distance: 1200009.000114 m
Q2: pathloss: 181.635698 dBm
Q3: RxPower: -80.895698 dBm
Q4: SNR: 29.104302 dB
Q4: datarate: 19.340024 Mbps
Packet average end-to-end delay is 0.0102812s
```

Using datarate=8kbps

```
Packet average end-to-end delay is 0.718011s
```

Observation :

Rx power 有 beamforming 的比較大，因為有 Tx gain 加成(沒有的話是 1)
導致 SNR 跟 datarate 也比較大，用算出來的 datarate 來看 end to end delay
的話，都比原本的 8kbps 快很多。

在不同位置的時候，因為衛星都在頭頂，所以跟地面站的位置幾乎是一樣
(三顆衛星跟地面站的距離)，在沒有 beamforming 的狀況下，Tx gain 都代
一，且距離一樣，導致 pathloss、Rxpower、SNR、datarate 也都一模一
樣。

而有 beamforming 的情況下，三個位置的 pathloss 會不一樣，是因為
beam 只能瞄準 0 : 5 : 90，所以在不同位置下，Tx gain 會不一樣。