ERROR MESSAGE


```
vm@vm-VirtualBox:/media/code$ python3 application.py
Error: you must run either in server or client mode
vm@vm-VirtualBox:/media/code$ python3 application.py -s -c
Error: you must run either in server or client mode
vm@vm-VirtualBox:/media/code$ python3 application.py -c -s
Error: you must run either in server or client mode
vm@vm-VirtualBox:/media/code$ python3 application.py -f photo.jpg
Error: you must run either in server or client mode
vm@vm-VirtualBox:/media/code$ python3 application.py -s -b 10.0.0
Error: invalid IP address
vm@vm-VirtualBox:/media/code$ python3 application.py -s -p 1023
Error: port number must be between 1024 and 65535
vm@vm-VirtualBox:/media/code$ python3 application.py -s -p 65536
Error: port number must be between 1024 and 65535
vm@vm-VirtualBox:/media/code$ python3 application.py -s -p 100FA
Error: port number must be an integer
vm@vm-VirtualBox:/media/code$ python3 application.py -s -m sta
Error: invalid operation mode
vm@vm-VirtualBox:/media/code$ python3 application.py -s -r gbn
Error: invalid flag -r for server mode
vm@vm-VirtualBox:/media/code$ python3 application.py -s -t loss
Error: invalid option for test
vm@vm-VirtualBox:/media/code$ python3 application.py -s -t done
Error: invalid option for test
vm@vm-VirtualBox:/media/code$ python3 application.py -c -f 123.jpg
Error: file does not exist
vm@vm-VirtualBox:/media/code$ python3 application.py -c -r sta
Error: invalid reliability function
vm@vm-VirtualBox:/media/code$ python3 application.py -c -m gbn
Error: invalid flag -m for client mode
vm@vm-VirtualBox:/media/code$ python3 application.py -c -t skipack
Error: invalid option for test
vm@vm-VirtualBox:/media/code$ python3 application.py -c -t done
Error: invalid option for test
```



```
vm@vm-VirtualBox:/media/code$ python3 application.py -s -b
usage: application.py [-h] [-s] [-c] [-b SERVER_IP] [-p SERVER_PORT]
                      [-f FILE] [-m MODE] [-r RELIABILITY] [-t TEST] [-o]
application.py: error: argument -b/--server_ip: expected one argument
vm@vm-VirtualBox:/media/code$ python3 application.py -s -p
usage: application.py [-h] [-s] [-c] [-b SERVER_IP] [-p SERVER_PORT]
                      [-f FILE] [-m MODE] [-r RELIABILITY] [-t TEST] [-o]
application.py: error: argument -p/--server_port: expected one argument
vm@vm-VirtualBox:/media/code$ python3 application.py -s -f
usage: application.py [-h] [-s] [-c] [-b SERVER_IP] [-p SERVER_PORT]
                      [-f FILE] [-m MODE] [-r RELIABILITY] [-t TEST] [-o]
application.py: error: argument -f/--file: expected one argument
vm@vm-VirtualBox:/media/code$ python3 application.py -s -m
usage: application.py [-h] [-s] [-c] [-b SERVER_IP] [-p SERVER_PORT]
                      [-f FILE] [-m MODE] [-r RELIABILITY] [-t TEST] [-o]
application.py: error: argument -m/--mode: expected one argument
vm@vm-VirtualBox:/media/code$ python3 application.py -s -t
usage: application.py [-h] [-s] [-c] [-b SERVER_IP] [-p SERVER_PORT]
                      [-f FILE] [-m MODE] [-r RELIABILITY] [-t TEST] [-o]
application.py: error: argument -t/--test: expected one argument
vm@vm-VirtualBox:/media/code$
```

```
vm@vm-VirtualBox:/media/code$ python3 application.py -c -b
usage: application.py [-h] [-s] [-c] [-b SERVER_IP] [-p SERVER_PORT]
                      [-f FILE] [-m MODE] [-r RELIABILITY] [-t TEST] [-o]
application.py: error: argument -b/--server_ip: expected one argument
vm@vm-VirtualBox:/media/code$ python3 application.py -c -p
usage: application.py [-h] [-s] [-c] [-b SERVER_IP] [-p SERVER_PORT]
                      [-f FILE] [-m MODE] [-r RELIABILITY] [-t TEST] [-o]
application.py: error: argument -p/--server_port: expected one argument
vm@vm-VirtualBox:/media/code$ python3 application.py -c -f
usage: application.py [-h] [-s] [-c] [-b SERVER_IP] [-p SERVER_PORT]
                      [-f FILE] [-m MODE] [-r RELIABILITY] [-t TEST] [-o]
application.py: error: argument -f/--file: expected one argument
vm@vm-VirtualBox:/media/code$ python3 application.py -c -m
usage: application.py [-h] [-s] [-c] [-b SERVER_IP] [-p SERVER_PORT]
                      [-f FILE] [-m MODE] [-r RELIABILITY] [-t TEST] [-o]
application.py: error: argument -m/--mode: expected one argument
vm@vm-VirtualBox:/media/code$ python3 application.py -c -t
usage: application.py [-h] [-s] [-c] [-b SERVER_IP] [-p SERVER_PORT]
                      [-f FILE] [-m MODE] [-r RELIABILITY] [-t TEST] [-o]
application.py: error: argument -t/--test: expected one argument
vm@vm-VirtualBox:/media/code$
```

VALID TESTS


```
vm@vm-VirtualBox:/media/code$ python3 application.py -s -f ./download/photo.jpg
Server listening on 192.168.0.17 port 8088 ...
Connected to ('192.168.0.17', 55806)
Receiving data...
Received: 2.57 MB
Time elapsed: 2.33 seconds
Throughput: 1.1 Mbps

vm@vm-VirtualBox:/media/code$
```

```
vm@vm-VirtualBox:/media/code$ python3 application.py -c -f photo.jpg
Connected to ('192.168.0.17', 8088)
Sending data...
Sent: 2.57 MB

vm@vm-VirtualBox:/media/code$
```



```
vm@vm-VirtualBox:/media/code$ python3 application.py -s -f ./download/photo.jpg -m gbn
Server listening on 192.168.0.17 port 8088 ...
Connected to ('192.168.0.17', 38024)
Receiving data...
Received: 2.57 MB
Time elapsed: 2.39 seconds
Throughput: 1.08 Mbps

vm@vm-VirtualBox:/media/code$
```

```
vm@vm-VirtualBox:/media/code$ python3 application.py -c -f photo.jpg -r gbn
Connected to ('192.168.0.17', 8088)
Sending data...
Sent: 2.57 MB

vm@vm-VirtualBox:/media/code$
```



```
vm@vm-VirtualBox:/media/code$ python3 application.py -s -f ./download/photo.jpg -m sr
Server listening on 192.168.0.17 port 8088 ...
Connected to ('192.168.0.17', 53398)
Receiving data...
Received: 2.57 MB
Time elapsed: 2.59 seconds
Throughput: 0.99 Mbps

vm@vm-VirtualBox:/media/code$
```

```
vm@vm-VirtualBox:/media/code$ python3 application.py -c -f photo.jpg -r sr
Connected to ('192.168.0.17', 8088)
Sending data...
Sent: 2.57 MB

vm@vm-VirtualBox:/media/code$
```



```
vm@vm-VirtualBox:/media/code$ python3 application.py -s -f ./download/photo.jpg -m gbn -t skipack
Server listening on 192.168.0.17 port 8088 ...
Connected to ('192.168.0.17', 53072)
Receiving data...
Received: 2.57 MB
Time elapsed: 3.68 seconds
Throughput: 0.7 Mbps

vm@vm-VirtualBox:/media/code$
```

```
vm@vm-VirtualBox:/media/code$ python3 application.py -c -f photo.jpg -r gbn -t loss
Connected to ('192.168.0.17', 8088)
Sending data...
Sent: 2.57 MB

vm@vm-VirtualBox:/media/code$
```

```
vm@vm-VirtualBox:/media/code$ python3 application.py -s -f ./download/photo.jpg -m gbn -t skipack -o
Server listening on 192.168.0.17 port 8088 ...
ack_num 1 seq_num 0, flags: ACK 1, SYN 1, FIN 0, RST 0, Data sent: 0
Connected to ('192.168.0.17', 33812)
Receiving data...
ack_num 1461 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 2921 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 4381 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 5841 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 7301 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 8761 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 10221 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 11681 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 13141 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 14601 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 16061 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 17521 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 18981 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 20441 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 21901 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 23361 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 24821 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
```

```
vm@vm-VirtualBox:/media/code$ python3 application.py -c -f photo.jpg -r gbn -t loss -o
ack_num 0 seq_num 0, flags: ACK 0, SYN 1, FIN 0, RST 0, Data sent: 0
ack_num 1 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
Connected to ('192.168.0.17', 8088)
Sending data...
ack_num 1 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 1461, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 2921, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 4381, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 5841, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 7301, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 8761, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 10221, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 11681, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 13141, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 14601, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 16061, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 17521, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 18981, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 20441, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 21901, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 23361, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
```

```
ack_num 2549161 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 2550621 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 2552081 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 2553541 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
Packet received out of order with seq_num 2555001
Packet received out of order with seq_num 2556461
Packet received out of order with seq_num 2557921
Packet received out of order with seq_num 2559381
ack_num 2555001 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 2556461 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 2557921 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 2559381 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 2560841 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 2562301 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 2563761 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 2565221 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
ack_num 2566098 seq_num 1, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 0
All packets received
ack_num 2566098 seq_num 1, flags: ACK 1, SYN 0, FIN 1, RST 0, Data sent: 0
Connection closed

Number of ack lost: 0
Received: 2.57 MB
Time elapsed: 4.22 seconds
Throughput: 0.61 Mbps

vm@vm-VirtualBox:/media/code$
```

```
ack_num 1 seq_num 2546241, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 2547701, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 2549161, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 2550621, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 2552081, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
Lost packet with seq_num 2553541
ack_num 1 seq_num 2555001, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 2556461, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 2557921, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 2559381, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
Resending packet with seq_num 2553541
Resending packet with seq_num 2555001
Resending packet with seq_num 2556461
Resending packet with seq_num 2557921
Resending packet with seq_num 2559381
ack_num 1 seq_num 2560841, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 2562301, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 2563761, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 1460
ack_num 1 seq_num 2565221, flags: ACK 1, SYN 0, FIN 0, RST 0, Data sent: 877
All packets sent
ack_num 1 seq_num 2566098, flags: ACK 0, SYN 0, FIN 1, RST 0, Data sent: 0
Connection closed

Number of packets lost: 3
Sent: 2.57 MB

vm@vm-VirtualBox:/media/code$
```