Packet Loss (Server)

Description:

Write a Python program that simulates UDP-based communication between a client and a server. The client sends a string one character at a time, with each character sent in a separate UDP packet.

The server listens on IP address 127.0.0.1 and port 9876, and receives each character and rebuilds the original string until it receives the special end-of-message character ('\0'). For simulation purposes, the server intentionally drops every 10th packet to mimic packet loss.

Once the full message is received, the server sends the reconstructed string back to the client. The client must then compare this received message to the original string and detect which characters were lost during transmission.

Message sent by the client:
K^sXjF@WeuQ{=nZrGMdVYtc#]Pk|a?o>Rb&Lq(ASz$Tw}iC+MJ*<!gHEhBfNUO dy

Input:

None (all parameters are hard-coded or passed in run mode)

Output (without unit test):

UDP server listening on 127.0.0.1:9876...

[Server] Dropping packet index 0: 'K'

[Server] Keeping packet index 1: '^'

[Server] Keeping packet index 2: 's'

[Server] Keeping packet index 3: 'X'

[Server] Keeping packet index 4: 'j'

[Server] Keeping packet index 5: 'F'

[Server] Keeping packet index 6: '@'

[Server] Keeping packet index 7: 'W'

[Server] Keeping packet index 8: 'e'

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[Server] Keeping packet index 9: 'u'
[Server] Dropping packet index 10: 'Q'
[Server] Keeping packet index 11: '{'
[Server] Keeping packet index 12: '='
[Server] Keeping packet index 13: 'n'
[Server] Keeping packet index 14: 'Z'
[Server] Keeping packet index 15: 'r'
[Server] Keeping packet index 16: 'G'
[Server] Keeping packet index 17: 'M'
[Server] Keeping packet index 18: 'd'
[Server] Keeping packet index 19: 'V'
[Server] Dropping packet index 20: 'Y'
[Server] Keeping packet index 21: 't'
[Server] Keeping packet index 22: 'c'
[Server] Keeping packet index 23: '#'
[Server] Keeping packet index 24: ']'
[Server] Keeping packet index 25: 'P'
[Server] Keeping packet index 26: 'k'
[Server] Keeping packet index 27: '|'
[Server] Keeping packet index 28: 'a'
[Server] Keeping packet index 29: '?'
[Server] Dropping packet index 30: 'o'
[Server] Keeping packet index 31: '>'
[Server] Keeping packet index 32: 'R'
[Server] Keeping packet index 33: 'b'
[Server] Keeping packet index 34: '&'
[Server] Keeping packet index 35: 'L'
[Server] Keeping packet index 36: 'q'
[Server] Keeping packet index 37: '('
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[Server] Keeping packet index 38: 'A'
[Server] Keeping packet index 39: 'S'
[Server] Dropping packet index 40: 'z'
[Server] Keeping packet index 41: '$'
[Server] Keeping packet index 42: 'T'
[Server] Keeping packet index 43: 'w'
[Server] Keeping packet index 44: '}'
[Server] Keeping packet index 45: 'i'
[Server] Keeping packet index 46: 'C'
[Server] Keeping packet index 47: '+'
[Server] Keeping packet index 48: 'M'
[Server] Keeping packet index 49: 'J'
[Server] Dropping packet index 50: '*'
[Server] Keeping packet index 51: '<'
[Server] Keeping packet index 52: '!'
[Server] Keeping packet index 53: 'g'
[Server] Keeping packet index 54: 'H'
[Server] Keeping packet index 55: 'E'
[Server] Keeping packet index 56: 'h'
[Server] Keeping packet index 57: 'B'
[Server] Keeping packet index 58: 'f'
[Server] Keeping packet index 59: 'N'
[Server] Dropping packet index 60: 'U'
[Server] Keeping packet index 61: 'O'
[Server] Keeping packet index 62: 'd'
[Server] Keeping packet index 63: 'y'
[Server] End-of-transmission signal received.
[Server] Sent response to ('127.0.0.1', 50062)
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Output (with unit test):

✅ Used UDP socket

✅ Bound to address (127.0.0.1, 9876)

✅ Printed expected dropped/kept packet logs

✅ Sent correct response message back to client

✅ test_udp_packet_drop_logic passed all checks