The probability that the client can connect after k tries is:

$$P(\text{connect after k tries})$$
$$= 1 - (1 - P(\text{connect after 1 try}))^k$$
$$= 1 - (1 - (1 - \epsilon_i)^i)^k$$

the required number of connection attempts is:

$$k = \frac{\log(1 - P(connect))}{\log(1 - (1 - \epsilon_i)^i)}$$

A nice feature of this formula is that the expected number of connection attempts depends logarithmically on the connection probability, which indicates that even for large ϵ_i, a determined client can get a connection after a moderate waiting time.