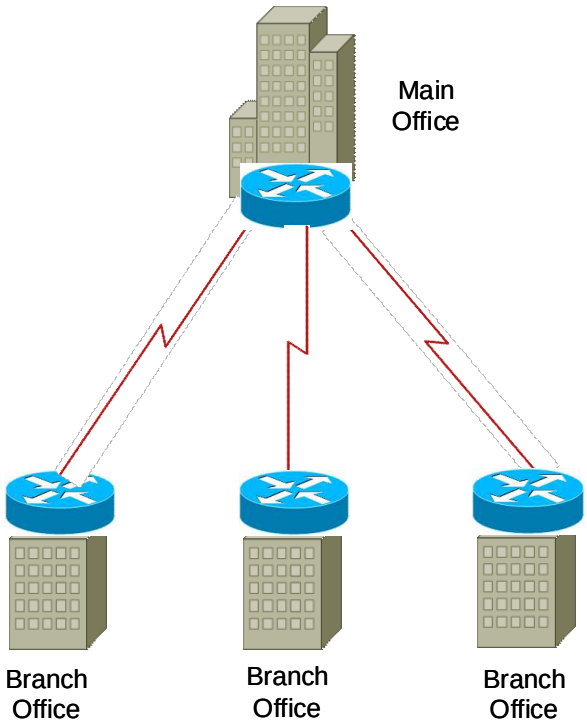The network of a small company has been designed according to a *Hub-and-Spoke* hierarchical topology (see figure below). The LAN in each branch office is connected to the main office via a router and a link with capacity *C* equal to 128 Kbps (1 Kbit = 1000 bits). In one of the sites the outgoing traffic flow has been mainly generated by CAD applications up to now. With regard to that traffic, which can be modeled by a Poisson process with rate $\lambda_0 = 3$ packets/s, it is required that the queuing delay in the router (for the queued packets) is less than 0.5 seconds with probability greater than 0.99. Following a new configuration of the business processes, it is necessary to install a number of computers for office automation. It is expected that each of them generates a flow of packets towards the central office at an average rate $\lambda = 1$ packet/s. For the latter flow, it is required that the average time spent in the router is less than or equal to 1 second.
Packet sizes can be modeled by independent random variables which are exponentially distributed with a mean value D = 500 bytes.
1) Assume that the output queue of the router has an infinite size and is shared by all the traffic flows according to the FCFS policy. Determine the maximum number M of new computers that can be installed.
2) Considering the above value M, evaluate the packet loss probability in case the output queue size is limited to 10 packets.