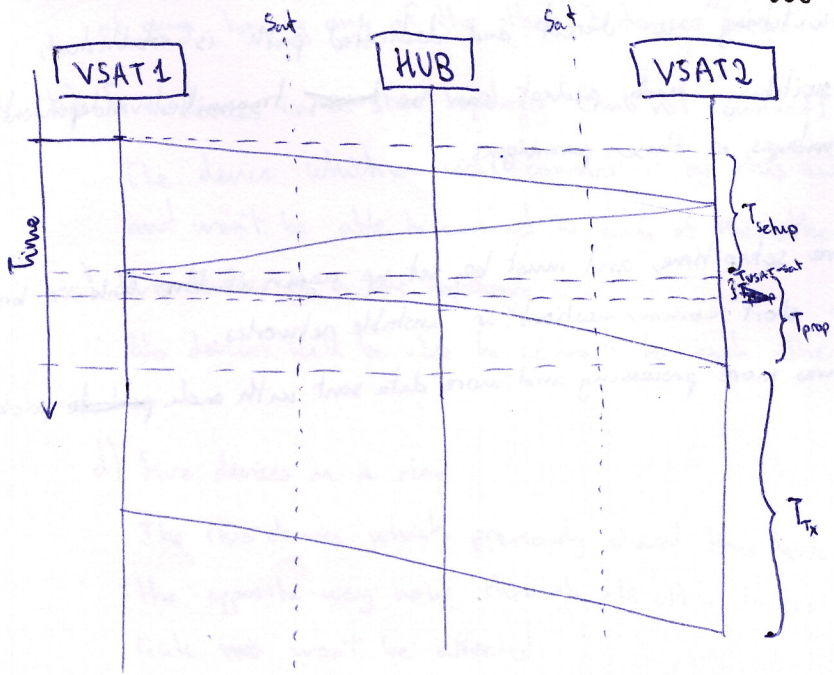
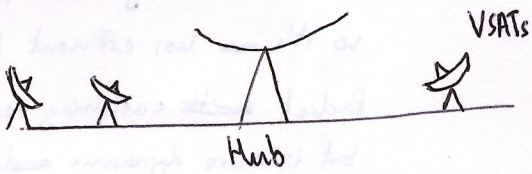
1.2.2. How long will it take to transmit a 1GB file from one VSAT to another using a hub as shown in the figure? Assume the uplink is 1 Mbps, the downlink is 7Mbps and circuit switching is used with 1.2s set up time. Assume the distance between the satellites and the hub is 35 800 km and propagation speed is 300 000 km/s.





$$T_{total} = T_{setup} + T_{prop} + T_{Tx} = T_{setup} + 4 \cdot T_{earth-sat} + \frac{Size(Tx)}{D.Rate} = T_{setup} + 4 \cdot \frac{d_{earth-sat}}{Prop.speed} + \frac{Size(Tx)}{D.Rate} =$$

$$= 1.2s + 4 \cdot \frac{35800\,km}{300000\,\frac{km}{s}} + \frac{1024 \cdot 1000\,MB \cdot 8\,\frac{b}{B}}{1\,Mb/s} = 8193.68\,s$$