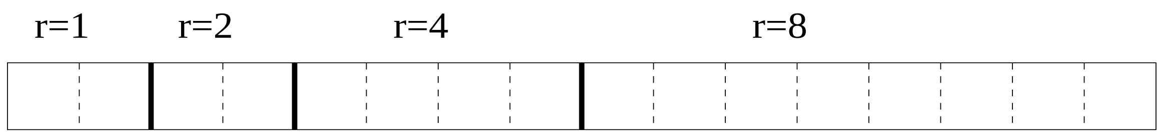

Whenever sampling rate changes, scan entries in $\mathcal{S}$.

For each entry (c, f),
repeatedly toss an coin with probability of $\frac{1}{r}$ for heads.

If coin toss is successful, stop.
If coin toss is not successful the frequency f is decremented by 1.

If f becomes 0, the entry is deleted from $\mathcal{S}$.

Entry x is an occurence of a

Prob(x is first a count in $\mathcal{S}$) $= 1/r$

When rate changes to $\frac{1}{2r}$

Coin toss with odds 1/2, Prob $= 1/r \times 1/2 = \frac{1}{2r}$

Error:

Prob(x is first a count in $\mathcal{S}$) $\neq 1/r$

E.g. x is the third occurrence of a the stream,

Prob $= (1 - 1/r)^2(1/r)$

Coin toss with odds 1/2:

Prob $= (1 - 1/r)^2(1/r) \times 1/2$