A[redacted]roximatin Rate-base[redacted]

In a network such as the Internet, the flows are defined by end-to-end connections. These flows are highly dynamic and transient in nature. New flows are constantly added at a very fast rate and most of them are short-lived. Therefore, the amount of state information that these schedulers may need to keep, is huge. Moreover, there is no explicit connection-setup protocol that informs the intermediate routers about these flows. Maintaining the flow state also requires an algorithm to estimate the set of active flows. Therefore implementing the scheduling alg on the state of packets in its queue. As a result of this decision, the policy very closely approximates the

Let $h : (\blacksquare^{+N}, \blacksquare) \rightarrow \blacksquare^{+N}$ be a function that maps an N-dimensional vector of input rate

3.4 Static Priority Scheduling

In static priority scheduling, different classes are assigned scheduling priorities depending on their requirements. The highest priority class gets the most preferential treatment. The packets of the highest priority class are the first ones to be served. In case there are no remaining packets from the highest priority class, packets from the next priority class are served and so on.

Let the classes be arranged in decreasing order of their priorities such that class 1 is the highest priority class and class N is the lowest priority class. The scheduling function for static priority scheduling can be defined as:

$$\begin{aligned} h_1(\underline{r}, C) &= \min(r_1, C) \\ h_i(\underline{r}, C) &= \max(0, \min(r_i, C - \textstyle\sum_{j=1}^{i-1} r_j)) \end{aligned} \tag{9}$$

The static priority scheduler assig

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property of the scheduler, $\sum_{j=1}^{N} h_j(\underline{r}, C) = C$. Therefore,

$$\sum_{j=1}^{N} Q_j^{max} = \frac{B}{C} \sum_{j=1}^{N} h_j(\underline{r}, C) \quad (12)$$

$$= B. \quad (13)$$

Thus, deterministic DBQ ensures that queue length never exceeds the target buffer occupancy B and it is allocated to the flows in proportion to their desired output rates. This ensures that the average output rate of a flow is equal to its desired output rate.

Deterministic DBQ however has some problems. Firstly it is not f

discarded. On the other hand, if there is a packet arrival on an inactive flow i (for which $Q_i + Q_i^d = 0$), a new state corresponding to flow i is created.

5.3 Large number of active flows

The error in rate estimation depends on the target buffer size B and the maximum packet size L^{max}.

Consider a a flow i which sends packets of si

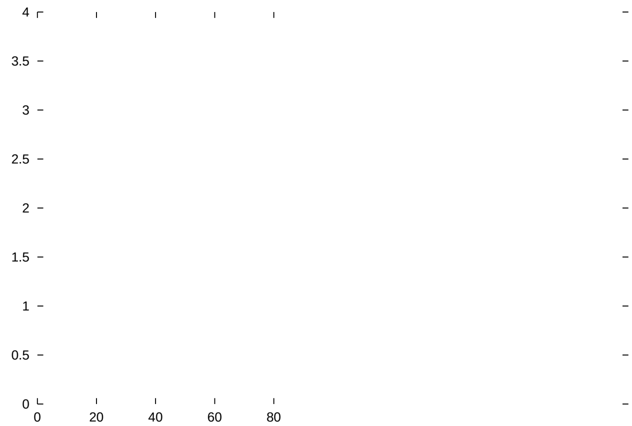
where Q'_f satisfies:

$$\sum_{j=1}^{N} \min\left(Q_i + Q_i^d, W(Q_i + Q_i^d)\frac{Q'_f}{W(Q'_f)}\right) = B. \tag{23}$$

Q'_f and Q_f are related as:

$$\frac{B}{Q}\frac{Q_f}{W(Q_f)} = \frac{Q'_f}{W(Q'_f}$$

In the deterministic DBQ, the amount of buffer space allocated to priority class i is equal to the space left after allocating β times the total queue length (including the d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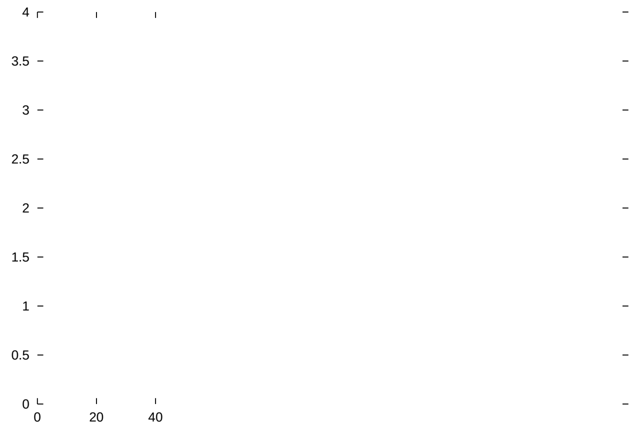
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complex schedulers in this

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