a proxy server is required to set $\alpha$ and $\beta$ in accordance with required throughput and other referenced parameters. Then, it starts the window size delegation. In this section, we discuss how to set $\alpha$ and $\beta$.

1) $\alpha$: Here, we consider a case where STA $i$ becomes a client, STA $j$ becomes a provider, respectively. We set optimal $\alpha$ in accordance with a required throughput of STA $i$ $\theta^r_i$ and a ‘referenced’ throughput of the STA $\theta_i$. As the first step just after the ‘start’ in Fig. 6, a proxy server measures $\theta_i$ before starting the window size delegation, and then the proxy server calculates appropriate $\alpha$ from $\theta_i$ and $\theta^r_i$.

Let us show the relationship between throughput and window size without window size delegation. Ideally, in the steady state, the congestion window size of STA $i$ $W_i(t)$ changes as the dashed line does in Fig. 7. In this case, the relationship is written as

$$\theta_i = \frac{\int_{T_D} W_i(t) dt}{T_D} = \frac{D_i}{T_D} \frac{W_i^d}{2} \cdot T_D + \frac{1}{2} \cdot \frac{W_i^d}{2} \cdot T_D$$

$$= \frac{D_i}{T_D} (\frac{3}{2} \cdot \frac{W_i^d}{2}),$$

(3)

where $D_i$ is the size of packets sent to STA $i$, $W_i^d$ is the congestion window size when triple-duplicate ACKs occur in the static state; $T_D$ is a duration after triple-duplicate ACKs occur until the next triple-duplicate ACKs occur.

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Fig. 5. Ideal change in congestion window size over time when $\alpha = 1.0$