Algorithm : DDoS flooding Detection with Q-learning
Input: learning rate α, attack factor γ, number of time slots N, initialize every Q table entries to 0 (i.e $Q(s, a)=0$, $s \rightarrow$ initialized state).
repeat
Start V2V or V2I communication.
Observe current system state at certain time $s^t = (Y^t, \Theta^t) \in S$.
Select optimal threshold θ^*
for $i \leftarrow$ 1 to N vehicle node do
Calculate entropy $Hs(X)$ through equation 4.
Normalize with to get $Hns(X)$
if $Hns(X) < \theta^*$ **then**
Communication begins.
else
Alert through alarm to administrator.
Monitor alarm with *Defender*.
end
end
Gain reward (r) and make over to a fresh state (s)
Revise the Q table entries (i.e $Qt(s, a)$ to $Qt+1(s, a)$)
Change previous state s to s'.
until *detection of attack is fully completed*;

Fig. 4. DDoS flooding detection with Q learning algorithm.

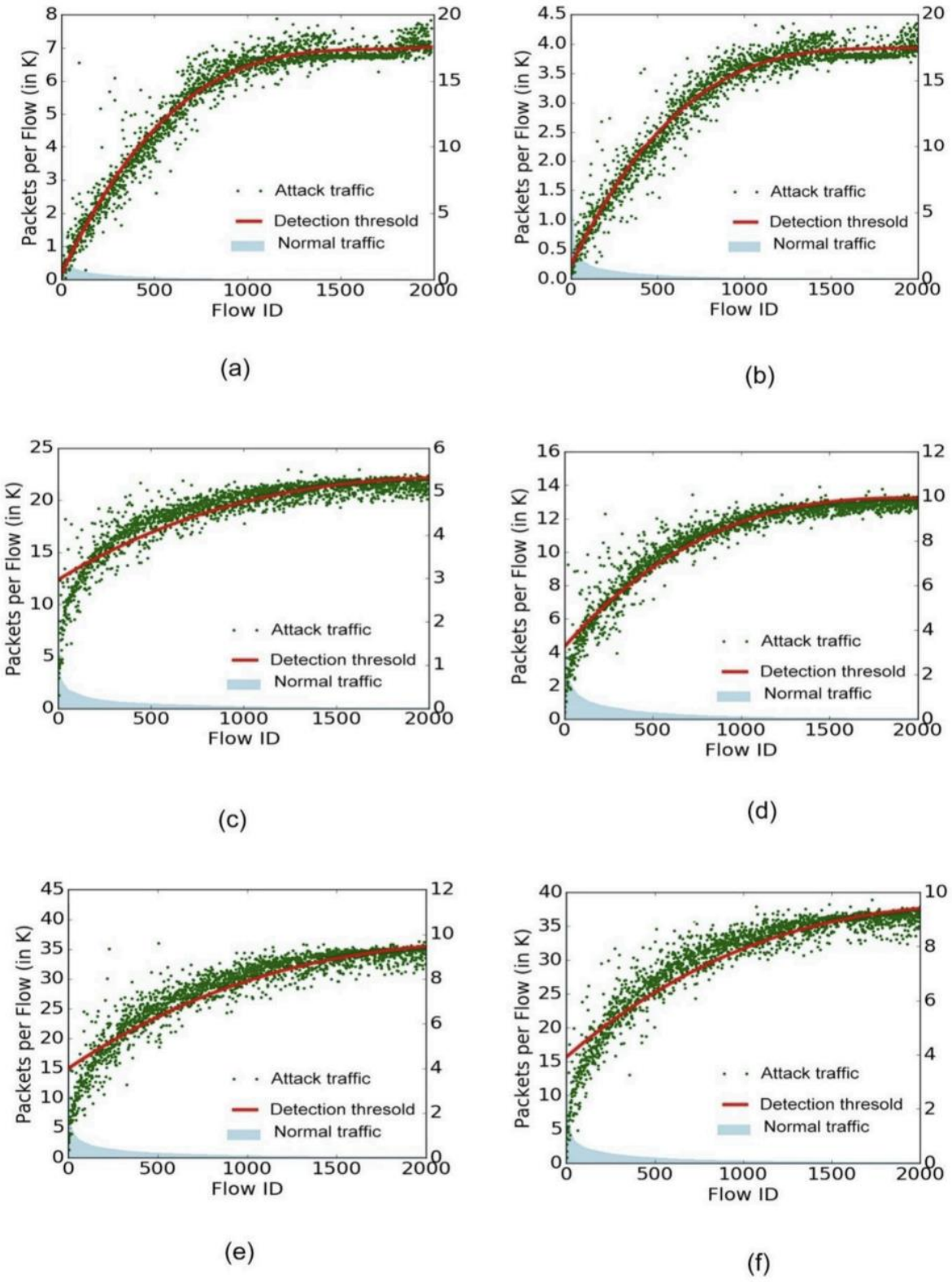

Fig. 5. Results of DDoS attack detection for both RSU and Vehicle.