CLAIMS:

1. A system for verifying a veracity of data packets being forwarded in a Software Defined Network (SDN) comprising a SDN controller, a first switch and a second switch;

the SDN controller is configured to:

generate and transmit orders to the first switch and the second switch to return a first detection data and a second detection data of a network flow;

receive the first detection data and the second detection data, the first detection data being a number of data packets from the network flow with a first label reported by the first and second switches, and the second detection data being a content associated to the data packets from the network flow with the first label reported by the first and second switches;

perform an analysis by comparing the first and second detection data from the first switch with the first and second data from the second switch respectively; and

raise an action ticket if the analysis on the first and second detection data fails.

2. The system according to claim 1 wherein the first switch and the second switch are two switches in an expected forwarding path of the network flow, and the second switch is a downstream switch with respect to the first switch.

3. The system according to claim 1 or 2 wherein the first switch is an ingress switch and the second switch is an egress switch.

4. The system according to anyone of claims 1-3 wherein the SDN controller is specially configured to:

determine whether the number of data packets received from the first switch is equal to the number of data packets received from the second switch; and

determine whether the content associated to the data packets received from the first and second switches are the same.

5. The system according to any one of claims 1-4, further comprising a third switch, wherein the SDN controller is configured to:

generate and transmit orders to the third switch, the third switch being an intermediate switch randomly selected between the first and second switches in the forwarding path of the network flow.

6. The system according to claim 5 wherein the SDN controller is configured to:

compare the number of data packets received from each of the first, second and third switches are the same; and

compare the content associated to the data packets received from each of the first, second and third switches are the same.

7. The system according to anyone of claims 1-6 wherein the first switch is configured to:

update flow tables and group tables according to the orders received from the SDN controller;

receive and sample data packets from the selected network flow;

tag sampled data packets with the first label; and

forward the data packets to the next hop and a content associated to the data packets with the first label to the SDN controller and report the number of sampled data packets to the SDN controller.

8. The system according to claim 7 wherein the first switch is further configured to:

tag non-sampled data packets with the second label.

9. The system according to claims 7 or 8 wherein the first switch is further configured to:

compute a message digest of all the sampled data packets to determine the content associated to the data packets with the first label.

10. The system according to anyone of claims 1-9 wherein the second switch is configured to:

update flow tables and group tables according to the orders received from the SDN controller;

receive data packets from the selected network flow;

determine whether the data packets have been tagged with the first label;

in response to determining the data packets having been tagged with the first label, remove the first label from the data packets; and

forward the number of data packets with the first label and the content associated to the data packets with the first label to the SDN controller.

11. The system according to claim 10 wherein the second switch is further configured to:

remove the second label from the data packets in response to determining the data packets not having been tagged with the first label.

12. The system according to claim 11 wherein the second switch is further configured to:

compute a message digest of all the data packets with the first label to determine the content associated to the data packets with the first label.

13. The system according to claim 5 or 6 wherein the third switch is configured to:

update flow tables and group tables according to the orders received from the SDN controller;

receive data packets from the selected network flow;

count the number of data packets with the first label; and

forward the number of data packets with the first label to the SDN controller.

14. The system according to claim 13 wherein the third switch is configured to:

forward the content associated to the data packets with the first label to the SDN controller.

15. The system according to claim 13 or 14 wherein the third switch is further configured to:

compute a message digest of all the data packets with the first label to determine the content associated to the data packets with the first label.

16. A method for verifying a veracity of data packets being forwarded in a Software Defined Network (SDN) having a SDN controller and multiple switches, the method comprising:

generating and transmitting orders to a first switch and a second switch to return a first detection data and a second detection data of a network flow;

receiving the first detection data and the second detection data, the first detection data being the number data packets from the network flow with a first label reported by the first and second switches, and the second detection data being a content associated to the data packets from the network flow with the first label reported by the first and second switches;

performing an analysis by comparing the first and second detection data from the first switch with the first and second data from the second switch respectively; and

raising an action ticket if the analysis on the first and second detection data fails.

17. The method according to claim 16 wherein the step of performing an analysis on the first and second detection data comprises:

determining whether the number of data packets received from the first switch is equal to the number of data packets received from the second switch; and

determining whether the contents associated to data packets received from the first and second switches are the same.

18. The method according to claim16 or 17 further comprising:

generating and transmitting orders to a third switch, the third switch being an intermediate switch randomly selected between the first and second switches in the forwarding path of the network flow.

19. The method according to claim 18 wherein the step of performing an analysis on the first and second detection data comprises:

determining whether the number of data packets received from each of the first, second and third switches are the same; and

determining whether the content associated to the data packets received from each of the first and second switches are the same.

20. The method according to claims 18 wherein the step of performing an analysis on the first and second detection data comprises:

determining whether the number of data packets received from each of the first, second and third switches are the same; and

determining whether the content associated to the data packets received from each of the first, second and third switches are the same.

21. A controller for verifying a veracity of data packets being forwarded in a Software Defined Network (SDN), the SDN controller having a non-transitory memory, a processor and instructions stored on the memory executable by the processor to:

generate and transmit orders to a first switch and a second switch to return a first detection data and a second detection data of a network flow;

receive the first detection data and the second detection data, the first detection data being the number data packets from the network flow with a first label reported by the first and second switches, and the second detection data being a content associated to the data packets from the network flow with the first label reported by the first and second switches;

perform an analysis on the first and second detection data; and

raise an action ticket if the analysis on the first and second detection data fails.

22. The controller according to claim 21 wherein the instruction to perform an analysis on the first and second detection data comprises instructions stored on the memory executable by the processor to:

determine whether the number of data packets received from the first switch is equal to the number of data packets received from the second switch; and

determine whether the contents associated to data packets received from the first and second switches are the same.

23. The controller according to claim 21 or 22 wherein the instruction further comprises instructions stored on the memory executable by the processor to:

generate and transmit orders to a third switch, the third switch being an intermediate switch randomly selected between the first and second switches in the forwarding path of the network flow.

24. The controller according to claim 23 wherein the instruction to perform an analysis on the first and second detection data comprises instructions stored on the memory executable by the processor to:

determine whether the number of data packets received from each of the first, second and third switches are the same; and

determine whether the content associated to the data packets received from each of the first and second switches are the same.

25. The controller according to claims 23 wherein the instruction to perform an analysis on the first and second detection data comprises instructions stored on the memory executable by the processor to:

determine whether the number of data packets received from each of the first, second and third switches are the same; and

determine whether the content associated to the data packets received from each of the first, second and third switches are the same.

26. A method for a switch in verifying a veracity of data packets being forwarded in a Software Defined Network (SDN) comprising a SDN controller and the switch, the method comprising:

updating flow tables and group tables according to orders received from the SDN controller;

receiving and sampling data packets from the selected network flow;

tagging sampled data packets with the first label; and

forwarding the data packets to the next hop and a content associated to the data packets with the first label to the SDN controller and report the number of sampled data packets to the SDN controller.

27. The method according to claim 26 wherein the switch is in an expected forwarding path of the network flow.

28. The method according to claims 26 or 27 wherein the method further comprising:

tagging non-sampled data packets with the second label.

29. The method according to anyone of claims 26-28 wherein the method further comprising:

computing a message digest of all the sampled data packets to determine the content associated to the data packets with the first label.

30. A switch for verifying a veracity of data packets being forwarded in a Software Defined Network (SDN) comprising a SDN controller and the switch; the switch having a non-transitory memory, a processor and instructions stored on the memory executable by the processor to:

update flow tables and group tables according to orders received from the SDN controller;

receive and sample data packets from the selected network flow;

tag sampled data packets with the first label; and

forward the data packets to the next hop and a content associated to the data packets with the first label to the SDN controller and report the number of sampled data packets with the first label to the SDN controller.

31. The switch according to claim 30 wherein the switch is in an expected forwarding path of the network flow.

32. The switch according to claims 30 or 31 wherein the instruction further comprises instructions stored on the memory executable by the processor to:

tag non-sampled data packets with the second label.

33. The switch according to anyone of claims 30-32 wherein the instruction further comprises instructions stored on the memory executable by the processor to:

compute a message digest of all the sampled data packets to determine the content associated to the data packets with the first label.

34. A method for a first switch and a second switch in verifying a veracity of data packets being forwarded in a Software Defined Network (SDN) comprising a SDN controller, the first switch and the second switch; the method comprising:

updating flow tables and group tables according to the orders received from the SDN controller;

receiving data packets from the selected network flow;

determining whether the data packets have been tagged with a first label;

in response to determining the data packets having been tagged with the first label, removing the first label from the data packets; and

forwarding the number of data packets with the first label and the content associated to the data packets with the first label to the SDN controller.

35. The method according to claim 34 wherein the first switch and the second switch are two switches in an expected forwarding path of the network flow, and the second switch is a downstream switch with respect to the first switch.

36. The method according to claims 34 or 35 wherein the method further comprising:

removing, by the second switch, a second label from the data packets in response to determining the data packets not having been tagged with the first label; wherein the second label is marked by the first switch.

37. The method according to anyone of claims 34-36 wherein the method further comprising:

computing a message digest of all the data packets with the first label to determine the content associated to the data packets with the first label.

38. A second switch for verifying a veracity of data packets being forwarded in a Software Defined Network (SDN) comprising a SDN controller a first switch and the second switch; the second switch having a non-transitory memory, a processor and instructions stored on the memory executable by the processor to:

update flow tables and group tables according to the orders received from the SDN controller;

receive data packets from the selected network flow;

determine whether the data packets have been tagged with a first label;

in response to determining the data packets having been tagged with the first label,

removing the first label from the data packets; and

forward the number of data packets with the first label and the content associated to the data packets with the first label to the SDN controller.

39. The second switch according to claims 38 wherein the instruction further comprises instructions stored on the memory executable by the processor to:

remove a second label from the data packets in response to determining the data packets not having been tagged with the first label; wherein the second label is marked by the first switch.

40. The second switch according to claims 38 or 39 wherein the instruction further comprises instructions stored on the memory executable by the processor to:

compute a message digest of all the data packets with the first label to determine the content associated to the data packets with the first label.

41. A method for a third switch in verifying a veracity of data packets being forwarded in a Software Defined Network (SDN) comprising a SDN controller, a first switch, a second switch and the third switch, the method comprising:

receiving data packets from a selected network flow;

counting the number of data packets with a first label; and

forwarding the number of data packets with the first label to the SDN controller.

42. The method according to claim 41 wherein the method further comprising:

forwarding a content associated to the data packets with the first label to the SDN controller.

43. The method according to claim 41 or 42 wherein the method further comprising:

computing a message digest of all the data packets with the first label to determine the content associated to the data packets with the first label.

44. A third switch for verifying a veracity of data packets being forwarded in a Software Defined Network (SDN) comprising a SDN controller, a first switch a second switch and the third switch; wherein the first and the second switch are two switches in an expected forwarding path of the network flow, the first switch is an ingress switch and the second switch is an egress switch; the third switch is located between the first switch and the second switch;

the third switch having a non-transitory memory, a processor and instructions stored on the memory executable by the processor to:

update flow tables and group tables according to orders received from the SDN controller;

receive and sample data packets from the selected network flow;

tag sampled data packets with the first label; and

forward the data packets to the next hop and a content associated to the data packets with the first label to the SDN controller and report the number of sampled data packets with the first label to the SDN controller.

45. The third switch according to claim 44 wherein the instruction further comprises instructions stored on the memory executable by the processor to:

forward a content associated to the data packets with the first label to the SDN controller.

46. The third switch according to claims 44 or 45 wherein the instruction further comprises instructions stored on the memory executable by the processor to:

compute a message digest of all the data packets with the first label to determine the content associated to the data packets with the first label.