CLAIMS

What is claimed is:

1. A computer-implemented method for dynamically offloading network traffic flows in one or more virtual networks, the computer-implemented method comprising:

identifying a virtual router through which to route network traffic of a specific network flow, wherein the specific network flow has a source endpoint existing on a source host machine and a destination endpoint existing on a destination host machine;

receiving flow statistics of network traffic transiting the virtual router including statistics about the specific network flow;

determining whether current network traffic of the specific network flow meets an offload rule using the received flow statistics by:

determining a number of network flows that have already been offloaded for the source host machine of the specific network flow; and

determining whether the number of offloaded network flows exceeds a threshold amount for the source host machine; and

in response to determining that the number of offloaded network flows does not exceed the threshold amount for the source host machine, dynamically offloading the specific network flow from the virtual router to ensure that subsequent network traffic of the specific network flow does not transit the virtual router.

2. The computer-implemented method of claim 1, wherein offloading the specific network flow from the virtual router further comprises:

creating a direct route between the source host machine and the destination host machine through which to route the specific network flow; and

routing subsequent specific network flow traffic through the direct route instead of the virtual router.

3. The computer-implemented method of claim 1 or claim 2, wherein the virtual router is identified based on characteristics of the specific network flow and at least one flow key of the virtual router defining network traffic that the virtual router is programmed to handle.

4. The computer-implemented method of any preceding claim, wherein determining whether the specific network flow meets an offload rule includes:

comparing the specific network flow bandwidth with a predefined bandwidth; and

determining that the specific network flow exceeds a bandwidth network flow when the specific network flow bandwidth is greater than the predefined bandwidth.

5. The computer-implemented method of any preceding claim, wherein receiving flow statistics includes receiving statistics about the bandwidth of the specific network flow.

6. The computer-implemented method of any preceding claim, wherein determining whether the specific network flow meets an offload rule includes:

determining an aggregate bandwidth flowing through the virtual router; and

determining whether the aggregate bandwidth exceeds a threshold bandwidth for the virtual router.

7. The computer-implemented method of any preceding claim, wherein flow statistics are received from at least one source, wherein the at least one source is: the source or destination virtual machines, the source or destination hosts, a router on the destination host, a programmable software switch on the source or destination host, a network monitoring system, or the virtual router.

8. The computer-implemented method of any preceding claim, wherein the source host machine is in a source cluster and the destination host machine is in a destination cluster that is different from the source cluster.

9. The computer-implemented method of claim 8, wherein identifying a virtual router through which to route network traffic of a specific network flow includes identifying a virtual router in the source cluster and a second virtual router in the destination cluster.

10. The computer-implemented method of any preceding claim, wherein the specific network flow has multiple destination virtual machines existing on multiple destination host machines in multiple clusters.

11. The computer-implemented method of any preceding claim, further comprising:

expiring or removing the specific flow in response to determining that the specific flow has been idle for a predetermined amount of time.

12. The computer-implemented method of any preceding claim, further comprising:

expiring or removing the specific flow in response to determining that the specific flow has been used below a threshold amount for a predetermined amount of time.

13. A system comprising:

one or more computers; and

one or more storage devices storing instructions that are operable, when executed by the one or more computers, to cause the one or more computers to perform operations comprising:

identifying a virtual router through which to router network traffic of a specific network flow, wherein the specific network flow has a source endpoint existing on a source host machine and a destination endpoint existing on a destination host machine;

receiving flow statistics of network traffic transiting the virtual router including statistics about the specific network flow;

determining whether current network traffic of the specific network flow meets an offload rule using the received flow statistics by:

determining a number of network flows that have already been offloaded for the source host machine of the specific network flow; and

determining whether the number of offloaded network flows exceeds a threshold amount for the source host machine; and

in response to determining that the number of offloaded network flows does not exceed the threshold amount for the source host machine, dynamically offloading the specific network flow from the virtual router to ensure that subsequent network traffic of the specific network flow does not transit the virtual router.

14. The system of claim 13, wherein offloading the specific network flow from the virtual router further comprises:

creating a direct route between the source host machine and the destination host machine through which to route the specific network flow; and

routing subsequent specific network flow traffic through the direct route instead of the virtual router.

15. The system of claim 13 or claim 14, wherein the virtual router is identified based on characteristics of the specific network flow and at least one flow key of the virtual router defining network traffic that the virtual router is programmed to handle.

16. The system of any one of claims 13 to 15, wherein determining whether the specific network flow meets an offload rule includes:

comparing the specific network flow bandwidth with a predefined bandwidth; and

determining that the specific network flow exceeds a bandwidth network flow when the specific network flow bandwidth is greater than the predefined bandwidth.

17. The system of any one of claims 13 to 16, wherein receiving flow statistics includes receiving statistics about the bandwidth of the specific network flow.

18. The system of any one of claims 13 to 17, wherein determining whether the specific network flow meets an offload rule includes:

determining an aggregate bandwidth flowing through the virtual router; and

determining whether the aggregate bandwidth exceeds a threshold bandwidth for the virtual router.

19. The system of any one of claims 13 to 18, wherein flow statistics are received from at least one source, wherein the at least one source is: the source or destination virtual machines, the source or destination hosts, a router on the destination host, a programmable software switch on the source or destination host, a network monitoring system, or the virtual router.

20. The system of any one of claims 13 to 19, wherein the source host machine is in a source cluster and the destination host machine is in a destination cluster that is different from the source cluster.

21. The system of claim 20, wherein identifying a virtual router through which to route network traffic of a specific network flow includes a virtual router in the source cluster and a second virtual router in the destination cluster.

22. The system of any one of claims 13 to 21, wherein the specific network flow has multiple destination virtual machines existing on multiple destination host machines in multiple clusters.

23. The system of any one of claims 13 to 22, further comprising:

expiring or removing the specific flow in response to determining that the specific flow has been idle for a predetermined amount of time.

24. The system of any one of claims 13 to 23, further comprising:

expiring or removing the specific flow in response to determining that the specific flow has been used below a threshold amount for a predetermined amount of time.

25. A non-transitory computer-readable medium storing software comprising instructions executable by one or more computers which, upon such execution, cause the one or more computers to perform operations comprising:

identifying a virtual router through which to route network traffic of a specific network flow, wherein the specific network flow has a source endpoint existing on a source host machine and a destination endpoint existing on a destination host machine;

receiving flow statistics of network traffic transiting the virtual router including statistics about the specific network flow;

determining whether current network traffic of the specific network flow meets an offload rule using the received flow statistics by:

determining a number of network flows that have already been offloaded for the source host machine of the specific network flow; and

determining whether the number of offloaded network flows exceeds a threshold amount for the source host machine; and

in response to determining that the number of offloaded network flows does not exceed the threshold amount for the source host machine, dynamically offloading the specific network flow from the virtual router to ensure that subsequent network traffic of the specific network flow does not transit the virtual router.

26. The non-transitory computer-readable medium of claim 25, wherein offloading the specific network flow from the virtual router further comprises:

creating a direct route between the source host machine and the destination host machine through which to route the specific network flow; and

routing subsequent specific network flow traffic through the direct route instead of the virtual router.

27. The non-transitory computer-readable medium of claim 25 or claim 26, wherein the virtual router is identified based on characteristics of the specific network flow and at least one flow key of the virtual router defining network traffic that the virtual router is programmed to handle.

28. The non-transitory computer-readable medium of any one of claims 25 to 27, wherein determining whether the specific network flow meets an offload rule includes:

comparing the specific network flow bandwidth with a predefined bandwidth; and

determining that the specific network flow exceeds a bandwidth network flow when the specific network flow bandwidth is greater than the predefined bandwidth.

29. The non-transitory computer readable medium of any one of claims 25 to 28, wherein receiving flow statistics includes receiving statistics about the bandwidth of the specific network flow.

30. The non-transitory computer readable medium of any one of claims 25 to 29, wherein determining the specific network flow meets an offload rule includes:

determining an aggregate bandwidth flowing through the virtual router; and

determining whether the aggregate bandwidth exceeds a threshold bandwidth for the virtual router.

31. The non-transitory computer readable medium of any one of claims 25 to 30, wherein flow statistics are received from at least one source, wherein the at least one source is: the source or destination virtual machines, the source or destination hosts, a router on the destination host, a programmable software switch on the source or destination host, a network monitoring system, or the virtual router.

32. The non-transitory computer readable medium of any one of claim 25 to 31, wherein the source host machine is in a source cluster and the destination host machine is in a destination cluster that is different from the source cluster.

33. The non-transitory computer readable medium of claim 32, wherein identifying a virtual router through which to route network traffic of a specific network flow includes identifying a virtual router in the source cluster and a second virtual router in the destination cluster.

34. The non-transitory computer readable medium of any one of claims 25 to 33, wherein the specific network flow has multiple destination virtual machines existing on multiple destination host machines in multiple clusters.

35. The non-transitory computer readable medium of any one of claims 25 to 34, further comprising:

expiring or removing the specific flow in response to determining that the specific flow has been idle for a predetermined amount of time.

36. The non-transitory computer readable medium of any one of claims 25 to 35, further comprising:

expiring or removing the specific flow in response to determining that the specific flow has been used below a threshold amount for a predetermined amount of time.