Method and Apparatus for NFV Management and Orchestration

TECHNICAL FIELD

The present invention relates to a method and apparatus for network virtualization, and, in particular embodiments, to a method and apparatus for network functions virtualization (NFV)-management and orchestration (MANO).

BACKGROUND

In the European Telecommunications Standards Institute (ETSI) NFV architecture, an orchestrator typically has access to data repositories including a network services catalog, a virtualized network function (VNF) catalog, a NFV Instances repository, and a NFV infrastructure (NFVI) resources repository.

The network services catalog is a repository of all the on-boarded network services. It includes a network services descriptor (NSD), a virtual link descriptor (VLD) and a VNF forwarding graph descriptor (VNFFGD). The VLD describes resource requirements that are needed for a link between VNFs, physical network functions (PNF) and endpoints. The VNFFGD includes a network forwarding path (NFP) element that includes an ordered list of connection points along with rules/policies associated to the list.

The VNF catalog is a repository of all the on-boarded VNF packages, and includes a VNF descriptor (VNFD) and software images. The VNFD describes a VNF in terms of its deployment and operational behavior, and is used by a virtual network function manager (VNFM) to instantiate the VNF and for lifecycle management of the VNF.

The NFV instances repository holds information of all VNF instances and network service (NS) instances. Each VNF instance is represented by a VNF record, and each NS instance is represented by an NS record.

The NFVI resources repository holds information about the available/reserved/ allocated NFVI resources as abstracted by a virtual infrastructure manager (VIM) across an

WHAT IS CLAIMED IS:

1. A method for network functions virtualization (NFV)-management and orchestration (MANO) comprising:

receiving, by a processing system, a customer request for a network service; and

generating, in accordance with the received customer request, a virtualized network function (VNF)-forwarding graph (FG) comprising a plurality of VNFs and a link connecting two of the VNFs in the plurality.

2. The method of claim 1, further comprising:

determining a NFV infrastructure (NFVI)-point of presence (PoP) for each of the plurality of VNFs in the VNF-FG.

3. The method of claim 2, wherein determining a NFVI-PoP for each of the plurality of VNFs in the VNF-FG comprises determining a NFVI-PoP for each of the plurality of VNFs in the VNF-FG based on a network service (NS) request, the NS request comprising the VNF-FG.

4. The method of claim 1, further comprising:

transmitting, by the processing system, an instruction to instantiate the plurality of VNFs using a virtual infrastructure manager (VIM) and a virtual network function manager (VNFM).

5. The method of claim 1, further comprising:

constructing, by the processing system, a network service (NS) request in accordance with the VNF-FG.

6. The method of claim 5, further comprising adding the constructed NS request to a NS catalog.

7. The method of claim 1, further comprising:

sending, by the processing system, a command requesting determination of NFVI-PoPs for the plurality of VNFs in the VNF-FG.

8. The method of claim 7, further comprising:

receiving, in response to the command, a message indicating determination of the NFVI-PoPs for the plurality of VNFs in the VNF-FG.

9. The method of claim 1, further comprising:

sending, in response to the customer request, an acknowledgement message indicating generation of the VNF-FG and determination of NFVI-PoPs for the plurality of VNFs in the VNF-FG.

10. The method of claim 1, wherein the VNF-FG comprises a VNF that is related to network performance assessment and enhancement.

11. An apparatus, comprising:

a processor; and

a non-transitory computer readable storage medium storing programming for execution by the processor, the programming including instructions for:

receiving a customer request for a network service; and

generating, in accordance with the received customer request, a virtualized network function (VNF)-forwarding graph (FG) comprising a plurality of VNFs and a link connecting two of the VNFs in the plurality.

12. The apparatus of claim 11, wherein the programming comprises further instructions for:

determining a NFV infrastructure (NFVI)-point of presence (PoP) for each of the plurality of VNFs in the VNF-FG.

13. The apparatus of claim 11, wherein the programming comprises further instructions for:

transmitting an instruction to instantiate the plurality of VNFs using a virtual infrastructure manager (VIM) and a virtual network function manager (VNFM).

14. The apparatus of claim 11, wherein the programming comprises further instructions for:

constructing a network service (NS) request in accordance with the VNF-FG; and

sending the constructed NS request for determination of a NFVI-PoP for each of the plurality of VNFs in the VNF-FG .

15. The apparatus of claim 14, wherein the programming comprises further instructions for adding the NS request to a NS catalog.

16. The apparatus of claim 11, wherein the programming comprises further instructions for:

sending a command requesting for determination of NFVI-PoPs for the plurality of VNFs in the VNF-FG.

17. The apparatus of claim 16, wherein the programming comprises further instructions for:

receiving, in response to the command, a message indicating determination of the NFVI-PoPs for the plurality of VNFs in the VNF-FG.

18. The apparatus of claim 17, wherein the programming comprises further instructions for:

sending, in response to the customer request, an acknowledgement message indicating generation of the VNF-FG and determination of NFVI-PoPs for the plurality of VNFs in the VNF-FG.

19. A computer program product comprising a non-transitory computer readable storage medium storing programming, the programming including instructions to generate a virtualized network function (VNF)-forwarding graph (FG) in accordance with a customer request for a network service, the VNF-FG comprising a plurality of VNFs and at least a link connecting the plurality of VNFs.

20. The computer program product of claim 19, wherein the programming comprises further instructions to determine a NFV infrastructure (NFVI)-point of presence (PoP) for each of the plurality of VNFs in the VNF-FG.