CLAIMS

1. A network data center (201) comprising:

a cloud-based services exchange point (303) comprising a network (301), the cloud-based services exchange point (303) operated by a cloud exchange provider that operates the network data center (201); and

a programmable network platform (120) comprising at least one programmable processor configured to:

receive a service request, for an end-to-end service, that includes a service definition according to a data model, wherein the service definition specifies a plurality of cloud services provided by respective cloud service provider networks (320) operated by respective cloud service providers, wherein the service definition specifies each of the plurality of cloud services according to a common micro-service definition that specifies:

a first endpoint of the cloud-based services exchange point, wherein the first endpoint identifies a first cloud service provider and specifies first endpoint-specific data that specifies at least one of a port, data center, and metro location for the first endpoint within the cloud-based services exchange point; and

a second endpoint of the cloud-based services exchange point, wherein the second endpoint identifies one of a customer and a second cloud service provider and specifies second endpoint-specific data that specifies at least one of a port, data center, and metro location for the second endpoint within the cloud-based services exchange point, wherein each of the cloud service provider networks (320) is co-located within the data center (201) and is coupled to the cloud-based services exchange point (303) by an aggregation link (322), wherein the service request further specifies a topology for the plurality of cloud services; and

provision, responsive to the service request, the cloud-based services exchange point (303) to forward service traffic for the end-to-end service along a sequence of the plurality of cloud services applied by the respective cloud service provider networks (320) to the service traffic according to the topology for the plurality of cloud services.

2. The network data center (201) of claim 1,

wherein to provision the cloud-based services exchange point (303) the programmable network platform is configured to configure a virtual router (12602) of the cloud-based services exchange point (303) to receive respective layer 3 routes for the cloud service provider networks (320), and

wherein the virtual router (12602) is configured to forward the service traffic according to the layer 3 routes for the cloud service provider networks (320) according to the topology for the plurality of cloud services.

3. The network data center (201) of claim 2,

wherein the cloud-based services exchange point (303) comprises a layer 3 (L3) autonomous system (301) operated by a cloud exchange provider and located within the network data center (201),

wherein the L3 autonomous system (301) comprises an Internet Protocol network (301) interconnecting a plurality of provider edge (PE) routers (302, 304) by a plurality of tunnels, and

wherein to provision the cloud-based services exchange point (303) the programmable network platform is configured to configure the plurality of PE routers (302, 304) to establish an end-to-end L3 path comprising one of the plurality of tunnels and connects, at layer 3, each of the cloud service provider networks (320) to the virtual router (12602).

4. The network data center (201) of claim 1,

wherein to provision the cloud-based services exchange point (303) the programmable network platform is configured to configure a virtual router (12602) of the cloud-based services exchange point (303) with respective layer 2 virtual private networks for the cloud service provider networks (320), and

wherein the virtual router (12602) is configured to forward the service traffic according to the respective layer 2 virtual private networks for the cloud service provider networks (320) according to the topology for the plurality of cloud services.

5. The network data center (201) of claim 1, wherein the service definition specifies an

authoritative service owner for the end-to-end service comprising the plurality of cloud services.

6. The network data center (201) of claim 1, wherein the service definition specifies a service identifier for the end-to-end service comprising the plurality of cloud services.

7. The network data center (201) of claim 1, wherein the service request is originated by a customer of the cloud exchange provider.

8. The network data center (201) of claim 1,

wherein the programmable network platform is configured to send, for each cloud service of the plurality of cloud services, a service request for the cloud service to an orchestration system for the corresponding cloud service provider network to cause the orchestration system to orchestrate the cloud service within the cloud service provider network.

9. The network data center (201) of claim 1,

wherein the service request further specifies a native service applied by the cloud-based services exchange point (303),

wherein the programmable network platform is configured to provision, responsive to the service request, the cloud-based services exchange point (303) to apply the native service to service traffic for at least one of the plurality of cloud services.

10. The network data center (201) of claim 1,

wherein the programmable network platform comprises a third-party orchestration module (1040) implemented by a first cloud service provider and registered with the programmable network platform (120) to present a common interface for the programmable network platform (120) for requesting cloud services from the plurality of cloud service providers,

wherein the programmable network platform (120) is configured to invoke, in response to the service request, the third-party orchestration (1040) module to communicate with a cloud

service provider orchestration system of the first cloud service provider of the cloud service providers to request that the first cloud service provider orchestrate, in a first cloud service provider network of the cloud service provider networks (320), a first cloud service of the plurality of cloud services for the service request; and

wherein the programmable network platform (120) is configured to provision the cloud-based services exchange point (303) to deliver the first cloud service, from the first cloud service provider network (320) attached to the cloud-based services exchange point (303), to a customer network (308) attached to the cloud-based services exchange point (303).

11. The network data center (201) of claim 10,

wherein the programmable network platform is configured to receive, from the third-party orchestration module, connectivity information for the first cloud service, and

wherein the programmable network platform is configured to provision, based on the connectivity information, the cloud-based services exchange point (303) to enable network connectivity between the cloud-based services exchange point (303) and the first cloud service provider network for delivery of the first cloud service.

12. A method comprising:

receiving, by a programmable network platform (120) for a cloud-based services exchange point (303) within a data center (201), a service request, for an end-to-end service, that includes a service definition according to a data model, wherein the service definition specifies a plurality of cloud services provided by respective cloud service provider networks (320) operated by respective cloud service providers,

wherein the service definition specifies each of the plurality of cloud services according to a common micro-service definition that specifies:

a first endpoint of the cloud-based services exchange point, wherein the first endpoint identifies a first cloud service provider and specifies first endpoint-specific data that specifies at least one of a port, data center, and metro location for the first endpoint within the cloud-based services exchange point; and

a second endpoint of the cloud-based services exchange point, wherein the second endpoint identifies one of a customer and a second cloud service provider and specifies second endpoint-specific data that specifies at least one of a port, data center, and metro location for the second endpoint within the cloud-based services exchange point, wherein each of the cloud service provider networks (320) is co-located within the data center (201) and is coupled to the cloud-based services exchange point (303) by an aggregation link (322), wherein the service request further specifies a topology for the plurality of cloud services; and

provisioning, by the programmable network platform (120) responsive to the service request, a network of the cloud-based services exchange point (303) to forward service traffic for the end-to-end service along a sequence of the plurality of cloud services applied by the respective cloud service provider networks (320) to the service traffic according to the topology for the plurality of cloud services.

13. A non-transitory computer readable medium comprising instructions that, when executed, cause at least one programmable processor of a programmable network platform (120) for a data center-based cloud-based services exchange point (303) to perform operations comprising: receiving a service request, for an end-to-end service, that includes a service definition according to a data model, wherein the service definition specifies a plurality of cloud services provided by respective cloud service provider networks (320) operated by respective cloud service providers,

wherein the service definition specifies each of the plurality of cloud services according to a common micro-service definition that specifies:

a first endpoint of the cloud-based services exchange point, wherein the first endpoint identifies a first cloud service provider and specifies first endpoint-specific data that specifies at least one of a port, data center, and metro location for the first endpoint within the cloud-based services exchange point; and

second endpoint of the cloud-based services exchange point, wherein the second endpoint identifies one of a customer and a second cloud service provider and specifies second endpoint-specific data that specifies at least one of a port, data center, and metro

location for the second endpoint within the cloud-based services exchange point, wherein each of the cloud service provider networks (320) is co-located within the data center (201) and is coupled to the cloud-based services exchange point (303) by an aggregation link (322), wherein the service request further specifies a topology for the plurality of cloud services; and

provisioning, responsive to the service request, a network of the cloud-based services exchange point (303) to forward service traffic for the end-to-end service along a sequence of the plurality of cloud services applied by the respective cloud service provider networks (320) to the service traffic according to the topology for the plurality of cloud services.