CLAIMS:

1. A switching device comprising:

Peripheral Component Interconnect Express (PCIe) upstream ports configured to couple to a host;

a PCIe downstream port coupled to the PCIe upstream ports and configured to couple to an input/output (I/O) device;

an internal connection line; and

an internal processing apparatus coupled to the PCIe downstream port using the internal connection line and configured to:

transmit a configuration read/write packet to the PCIe downstream port using the internal connection line,

receive, from the PCIe downstream port, in response to the configuration read/write packet, and using the internal connection line, a configuration read/write response packet comprising a completer identification, and

determine, according to the completer identification, that the switching device is coupled to the I/O device whose identification is the completer identification.

2. The switching device of claim 1, wherein the internal processing apparatus is further configured to:

store PCIe configuration content of the I/O device;

virtualize a function of the I/O device; and

implement a mapping between a first PCIe domain corresponding to the host and a second PCIe domain corresponding to the I/O device.

3. The switching device of claim 2, wherein the internal processing apparatus is further configured to store a first mapping relationship from a first identification in the first PCIe domain to a second identification in the second PCIe domain.

4. The switching device of claim 3, wherein the internal processing apparatus is further configured to store a second mapping relationship from the second identification to the first identification.

5. The switching device of claim 4, wherein the switching device is configured to store a mapping table comprising a base address register (BAR) address and a BAR size of a virtual function of the I/O device.

6. The switching device of claim 2, further comprising:

a host switching device comprising the PCIe upstream ports;

an Ethernet interface; and

an I/O switching device coupled to the host switching device via the Ethernet interface and comprising:

the internal processing apparatus,

a virtual endpoint device,

a mirroring endpoint device, and

the PCIe downstream port.

7. The switching device of claim 1, wherein the internal processing apparatus is further configured to:

receive an initialization instruction from a management baseboard management controller (BMC) in the host; and

further transmit the configuration read/write packet according to the initialization instruction

8. The switching device of claim 7, wherein the internal processing apparatus is further configured to report, to the management BMC after the I/O device couples to the switching device, identification information identifying the I/O device.

9. The switching device of claim 1, wherein the internal processing apparatus is further configured to:

receive configuration management information from a management baseboard management controller (BMC) in the host; and

configure the PCIe upstream ports and the PCIe downstream port according to the configuration management information.

10. The switching device of claim 1, wherein the internal processing apparatus is further configured to process an exception event and a hot swap event.

11. A Peripheral Component Interconnect Express (PCIe) system comprising:

a host comprising a management baseboard management controller (BMC), wherein the management BMC comprises a configuration management function;

an input/output (I/O) device; and

a switching device comprising:

Peripheral Component Interconnect Express (PCIe) upstream ports configured to couple to the host;

a PCIe downstream port coupled to the PCIe upstream ports and configured to couple to the I/O device;

an internal connection line; and

an internal processing apparatus coupled to the PCIe downstream port using the internal connection line and configured to:

transmit a configuration read/write packet to the PCIe downstream port using the internal connection line,

receive, from the PCIe downstream port, in response to the configuration read/write packet, and using the internal connection line, a configuration read/write response packet comprising a completer identification, and

determine, according to the completer identification, that the switching device is coupled to the I/O device whose identification is the completer identification.

12. The PCIe system of claim 11, further comprising a PCIe switch, wherein the PCIe downstream port is further configured to further couple to the I/O device using the PCIe switch.

13. The PCIe system of claim 11, further comprising a shelf management module (SMM), wherein the management BMC is configured to send, to the SMM, networking configuration information of the host, the switching device, and the I/O device.

14. A method for initializing a Peripheral Component Interconnect Express (PCIe) system, implemented by the PCIe system, and comprising:

sending, by a management baseboard management controller (BMC) in a host to an internal processing apparatus in a switching device, an initialization instruction;

determining, by the internal processing apparatus according to the initialization instruction, a first input/output (I/O) device connected to the switching device;

reporting, to the management BMC, first information about the first I/O device;

obtaining, by the host, second information about a second I/O device connected to the host; and

loading, by the host according to the second information, a virtual function drive and a physical function drive of the second I/O device.

15. The method of claim 14, further comprising:

sending, by the host, a configuration read packet;

receiving, by a target virtual endpoint device module of the switching device and using a PCIe upstream port of the switching device, the configuration read packet;

sending, by the target virtual endpoint device module, to the host, and according to the configuration read packet, a configuration read response packet; and

sending, by the host according to the configuration read response packet, a configuration write packet.

16. The method of claim 15, further comprising:

receiving, by the target virtual endpoint device module, from the host, and using the PCIe upstream port, the configuration write packet;

forwarding, by the target virtual endpoint device module, to a target I/O device, and using a PCIe downstream port of the switching device, the configuration write packet; and

receiving, by the target I/O device, from the target virtual endpoint device module, and using the PCIe downstream port, the configuration write packet.

17. The method of claim 16, further comprising:

sending, by the target I/O device, to the switching device, and according to the configuration write packet, a configuration write response packet;

receiving, by the switching device and from the target I/O device, the configuration write response packet;

forwarding, by the switching device, to the host, and using the PCIe upstream port, the configuration write response packet; and

obtaining, by the host from the configuration write response packet, information about the target virtual endpoint device module.

18. The method according to claim 17, further comprising:

obtaining, by the internal processing apparatus and from the target virtual endpoint device module, and the information; and

configuring, by the internal processing apparatus and according to the information, a mapping module of the switching device.

19. The method of claim 14, further comprising further loading, by the management BMC, a second physical function drive of a third I/O device when a virtual endpoint device module is configured to virtualize a virtual function of the third I/O device.

20. The method of claim 14, further comprising further loading, by a processor of a second host, a physical function drive of a third I/O device when a virtual endpoint device module is configured to virtualize a physical function of the third I/O device.