INCREMENTAL HIGH RADIX NETWORK SCALING

BACKGROUND

[0001] As an increasing number of applications and services are being made available over networks such as the Internet, and increasingly utilizing sources such as networked data centers, an increasing number of content, application, and/or service providers are turning to technologies such as cloud computing and Web services. In such environments, the hardware and/or software used to provide access to data and/or electronic resources typically needs to be scalable to meet the needs of various users at any given time. A user or customer typically will rent, lease, or otherwise pay for access to resources, and thus does not have to purchase and maintain the hardware and/or software to provide access to these resources.

[0002] Various approaches exist that enable resources such as data centers and Internet-Protocol (IP)-based networks to scale as the needs of the various users and applications increase. In some cases, this requires the purchase of large, expensive hardware that typically provides more capacity than is immediately necessary. In other cases, less expensive hardware devices can be used, but in order to handle conventional routing protocols the number of devices needed to scale can be quite large and complex to install. For a large number of resources to be provided, this can provide a significant expenditure and overhead, which can be undesirable in many instances.

SUMMARY

[0002a] According to a first aspect, there is provided a method of incremental scaling switches in a data center, comprising: providing a first set of one or more switches; providing a second set of one or more switches; providing a third set of one or more switches; connecting two or more ports of each switch of the first set with two or more ports of each switch of the second set using two or more connections; connecting each switch of the first set with each switch of the third set using one or more connections; providing a fourth set of switches equal in number to the second set; for each of the one or more switches of the second set, disconnecting one of the two or more connections to the first set; for each of the disconnected connections from the switches of the second set, reconnecting the disconnected connection with a respective switch of the fourth set; providing a fifth set of one or more switches; and connecting a respective port of each switch of the fifth set to a respective port of each switch of the second set, each switch of the third set, and each switch of the fourth set wherein connecting each switch of the fifth set with each switch of the second set, each switch of the third set, and each switch of the fourth set results in a formation of one at least one of i) a high radix network or ii) a fat tree network topology.

[0002b] According to a second aspect, there is provided a switch network in a data center comprising: a first set of one or more switches, wherein each switch in the first set of one or more switches includes two or more ports; a second set of one or more switches, wherein each switch in the second set of one or more switches includes two or more ports, and wherein two or more ports of each switch in the second set of one or more switches are connected with at least two or more ports of each switch of the first set of one or more switches; a third set of one or more switches connected with each switch of the first set of one or more switches utilizing one of the two or more connections between a respective switch of the first set of switches and a respective switch of the second set of switches, wherein the one of the two or more connections is disconnected from the respective switch of the second set of switches and reconnected with the respective switch of the third set of switches; and a fourth set of one or more switches connected with each switch of the second set of switches and the third set of switches , wherein connecting the first set, second set, third set, and fourth set of switches results in the formation of at least one of i) a high radix network or ii) fat tree topology.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] Various embodiments in accordance with the present disclosure will be described with reference to the drawings, in which:

[0004] **FIG. 1** illustrates an environment in which various embodiments can be implemented;

[0005] **FIG. 2** illustrates an example of a highly connected network design that can be used in accordance with various embodiments;

[0006] **FIGS. 3(a)** and **3(b)** illustrate views of a Clos-network style that can be utilized in accordance with various embodiments;