

achieve a particular functionality can be seen as “associated with” each other such that the desired functionality is achieved, irrespective of architectures or intermediate components. Likewise, any two components so associated can also be viewed as being “connected”, or “coupled”, to each other to achieve the desired functionality, and any two components capable of being so associated can also be viewed as being capable of being “coupled” to each other to achieve the desired functionality. Specific examples of objects capable of being coupled to each other include but are not limited to physically mated and/or physically interacting components and/or wirelessly interacting and/or wirelessly interacting components and/or logically interacting and/or logically interacting components.

While particular aspects of the present subject matter described herein have been shown and described, it will be apparent to those skilled in the art that, based upon the teachings herein, changes and modifications may be made without departing from the subject matter described herein and its broader aspects and, therefore, the appended claims are to encompass within their scope all such changes and modifications as are within the true spirit and scope of the subject matter described herein.

Furthermore, it is to be understood that the invention is defined by the appended claims.

Although particular embodiments of this invention have been illustrated, it is apparent that various modifications and embodiments of the invention may be made by those skilled in the art without departing from the scope and spirit of the foregoing disclosure. Accordingly, the scope of the invention should be limited only by the claims appended hereto.

It is believed that the present disclosure and many of its attendant advantages will be understood by the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the components without departing from the disclosed subject matter or without sacrificing all of its material advantages. The form described is merely explanatory, and it is the intention of the following claims to encompass and include such changes.

The invention claimed is:

1. A serial attached small computer system interface (SAS) input/output (I/O) control system comprising:

one or more SAS agents;
a plurality of physical or logical devices;
one or more SAS expanders connecting the physical devices to the one or more SAS agents and mediating I/O communications between the plurality of physical or logical devices and the one or more SAS agent;
each SAS expander including a plurality of Phys, wherein each Phy is associated with a particular physical device;
each SAS expander comprising a plurality of configurable I/O control register bits, wherein each configurable I/O control register bit is associated with a particular physical or logical device of the plurality of physical or logical devices, wherein each configurable I/O control register bit is controllable by one or more particular SAS agents of the one or more SAS agents;

wherein each SAS expander is further configured to enable SAS OPEN requests for the particular logical or physical device when the associated configurable I/O control register bit is set to a first value, and each SAS expander is further configured to disable SAS OPEN requests that are configured to leave a SAS link when the associated configurable I/O control register bit is set to a second value;

wherein each SAS expander is further configured to operate the plurality of configurable I/O control register bits; and

wherein each Phy is configured to return an OPEN REJECT (RETRY) response to a disabled OPEN request to delay and not cancel the disabled OPEN request when the associated particular configurable I/O control register bit is set to the second value.

2. The SAS I/O control system of claim 1, wherein multiple SAS agents are configured to operate a particular configurable I/O control register bit of the plurality of configurable I/O control register bits.

3. The SAS I/O control system of claim 1, wherein the physical devices comprise redundant array of independent disks (RAID) data storage devices.

4. The SAS I/O control system of claim 1, wherein the SAS expander is configured to allow discovery I/O operations to be completed more quickly by setting at least one of the plurality of configurable I/O control register bits to the second value.

5. The SAS I/O control system of claim 1, wherein, for a particular Phy, the SAS expander is configured to set a first particular configurable I/O control register bit associated with a first SAS protocol to the first value and configured to set a second particular configurable I/O control register bit associated with a second SAS protocol to the second value.

6. The SAS I/O control system of claim 1, wherein the physical devices comprise data storage devices.

7. The SAS I/O control system of claim 1, wherein each Phy has a set of enabled and disabled SAS protocols.

8. A serial attached small computer system interface (SAS) input/output (I/O) control system comprising:

a SAS agent;
a plurality of physical or logical devices;
a SAS expander connecting the physical devices to the SAS agent and mediating I/O communications between the plurality of physical or logical devices and the SAS agent;

wherein the SAS expander comprises a plurality of SAS Phys, wherein the SAS expander includes a plurality of configurable I/O control register bits, wherein each SAS Phy is associated with a particular physical or logical device, wherein each SAS Phy is associated with a particular configurable I/O control register bit, and wherein the SAS agent is authorized to operate each configurable I/O control register bit;

wherein each SAS Phy is configured to enable opening of a SAS connection or use of a SAS address when the particular configurable I/O control register bit is set to a first value, and wherein each SAS Phy is further configured to reject opening of the SAS connection and use of the SAS address when the particular configurable I/O control register bit is set to a second value;

wherein the SAS expander is further configured to operate each configurable I/O control register bit; and
wherein each SAS Phy is configured to return an OPEN REJECT (Retry) in response to a SAS connection request for a disabled protocol to delay and not cancel the SAS connection request for the disabled protocol when the particular configurable I/O control register bit is set to the second value.

9. The SAS I/O control system of claim 8, wherein additional SAS agents are configured to operate the plurality of configurable I/O control register bits.

10. The SAS I/O control system of claim 8, wherein the physical devices comprise data storage devices.