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To: T10 Technical Committee
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Subject: QAS without IU in SPI-4

In SPI-3, QAS (Quick Arbitration and Selection) was allowed only when IU (information units/packetized protocol) was enabled. Due to arbitration fairness concerns, systems were advised to only enable QAS when all devices on the bus supported it. If any device did not support QAS, it was recommended that QAS be turned off everywhere.

I propose we remove the IU/QAS restriction in SPI-4. It's a significant burden for tape drives and enclosure management devices to add information unit support. Unfortunately, this also rules out QAS, and prevents a system from using QAS if any such devices are present. It may not be as difficult to get these devices to implement QAS without IU, however. This would help these devices coexist on a bus with disk drives, expanding the number of systems that can actually use QAS.

The main technical reason for limiting QAS to IU mode was to simplify message snooping. Snooping devices need to know when to interpret 0x55 on the data bus as a QAS_REQUEST message rather than as part of some other message. It is simpler to detect that in IU mode, where the task management functions are handled in data phase packets rather than in messages. The QAS_REQUEST message is always the first message in the message phase following a data phase.

To relax this rule, QAS devices will need to snoop all message bytes, allowing the QAS_REQUEST to occur at any time. They will need to understand any sequence of message bytes, requiring understanding the lengths of all existing messages and parsing the lengths of extended messages. Messages currently marked reserved will need to be fixed in length forever.

The algorithm to enable QAS will become more complex. First, software must read INQUIRY data from all devices to determine IU and QAS support.
a) If any device does not support QAS, then it should remain disabled for all devices.
b) If all devices support both QAS and IU, then software may negotiate with both settings enabled together. (If any device does not end up in IU mode, QAS should be disabled for all devices).
c) If all devices support QAS but IU support is mixed, then software must first negotiate QAS without IU for each device. If this is rejected by any device, then QAS must be disabled for all devices. Such a device must have reported IU support, but followed SPI-3 rules to deny QAS without IU also enabled. If this negotiation is accepted for all devices, then QAS and IU can be negotiated together for devices which reported IU support and mixed operation can begin.