



To: Improved SCSI Protocol Ad-Hoc Group
From: Mike Kosco (MKosco@corp.adaptec.com)
Subject: SCSI LFP - Quick Arbitrate & Select Proposal
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1. Background

- 1) [add note to not do QAS with legacy initiators](#)
- 2) [the 0x55 code to define start of QAS is not needed \(this needs further investigation; it may be possible for a legacy device to go bus free in a fashion that looks like QAS\)](#)
- 3) [the target does not need to drive the ID – this saves 400 ns](#)
- 4) [change the fairness algorithm to that specified in SPI-2](#)
- 5) [change the start of QAS to release of ACK – some initiators hold ACK for extended period](#)
- 6) [may need mechanism to throttle QAS to allow non-QAS targets access to bus](#)
- 7) [need to describe the method an initiator could use to manage a mixed bus](#)

This proposal is part of a set of proposals that seek to improve parallel SCSI protocol efficiency. As data transfer speeds increase to fast-40 and beyond, protocol overhead becomes a significant factor in the performance of parallel SCSI. A protocol enhancement is herein proposed, called Quick Arbitrate and Select (QAS), to reduce overhead associated with parallel SCSI arbitration. An arbitration fairness scheme is included as well as an "Initiator Preemption" scheme.

The intent of the proposed protocol improvement is to be compatible with the existing parallel SCSI protocol.

2. Terminology

QAS - Quick Arbitrate and Select
 QAS Device - a SCSI device that supports the QAS protocol
 QAS message code - 55h

3. Quick Arbitrate and Select (QAS) Protocol

Quick Arbitrate and Select protocol allows the SCSI Target ready to give up the bus to govern who is to gain control of the bus next. [QAS is enabled with a bit in the Control Mode Page.](#)

[NOTE: Further discussion has led to retention of the QAS message. There is no definitive sequence to the signal release ever been defined so any sequence could theoretically occur.](#)

The protocol begins after the current QAS Target sends a DISCONNECT or COMMAND COMPLETE Message, instead of going to bus free, issues the new QUICK ARBITRATE AND SELECT (QAS / 0x55) broadcast message which only QAS-capable devices (Targets or Initiators) will understand. This implies that all QAS capable devices "snoop" the bus, watching for the QAS message to go by.

After detecting the QAS message, all QAS-capable devices requiring the bus place their ID's on the bus and wait for MSG to negate.

The current QAS Target, after sending the QAS message, negates MSG ~~and drives the winning devices' ID onto the bus.~~

When MSG is detected negated, the participating QAS devices remove their IDs from the bus, ~~while the current QAS Target holds the winner ID on the bus with the winner determined by the SPI-2 fairness algorithm.~~

After removing their IDs, the QAS participants sample the bus to see if their ID is still asserted on the bus to determine if they have won. If so, SEL is asserted by the winner along with it's Own ID and the ID to which it wishes to (re-)select. After SEL is detected asserted, the previous Target negates BSY.

We're now in "standard" selection phase.

Figure 1 defines the QAS protocol.

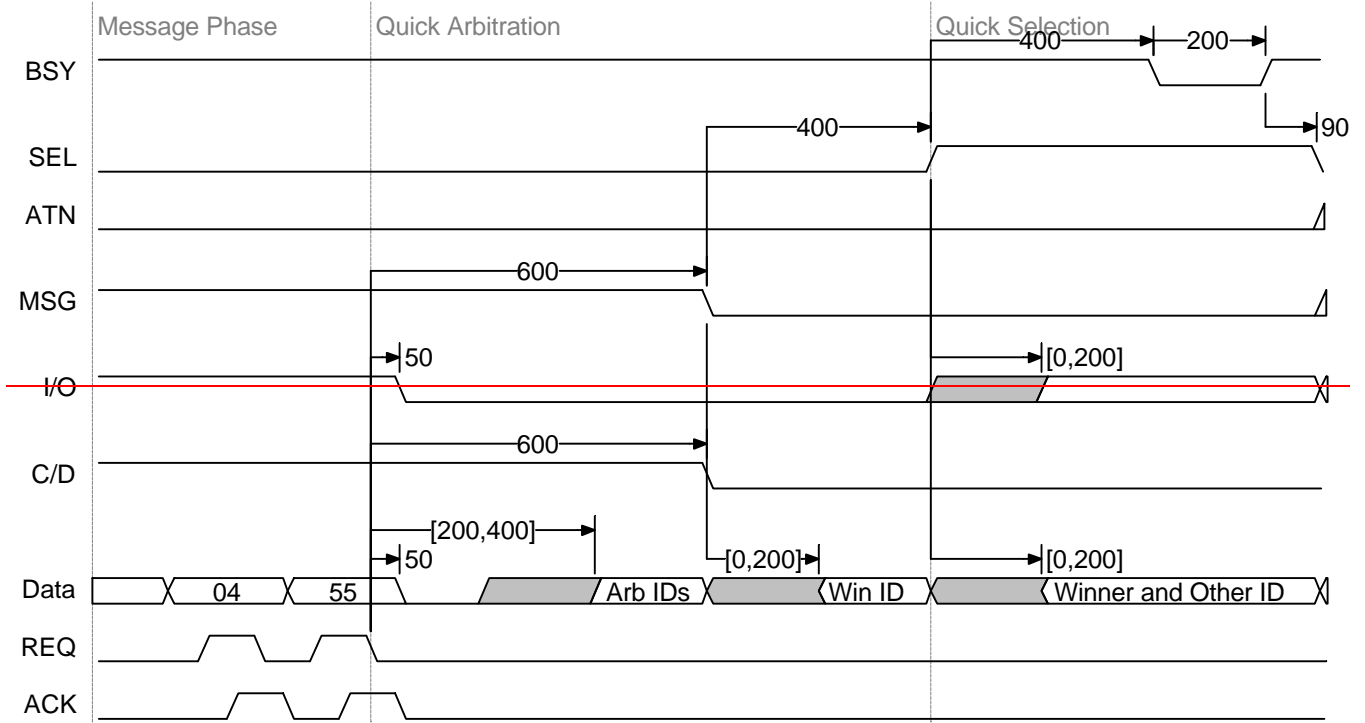
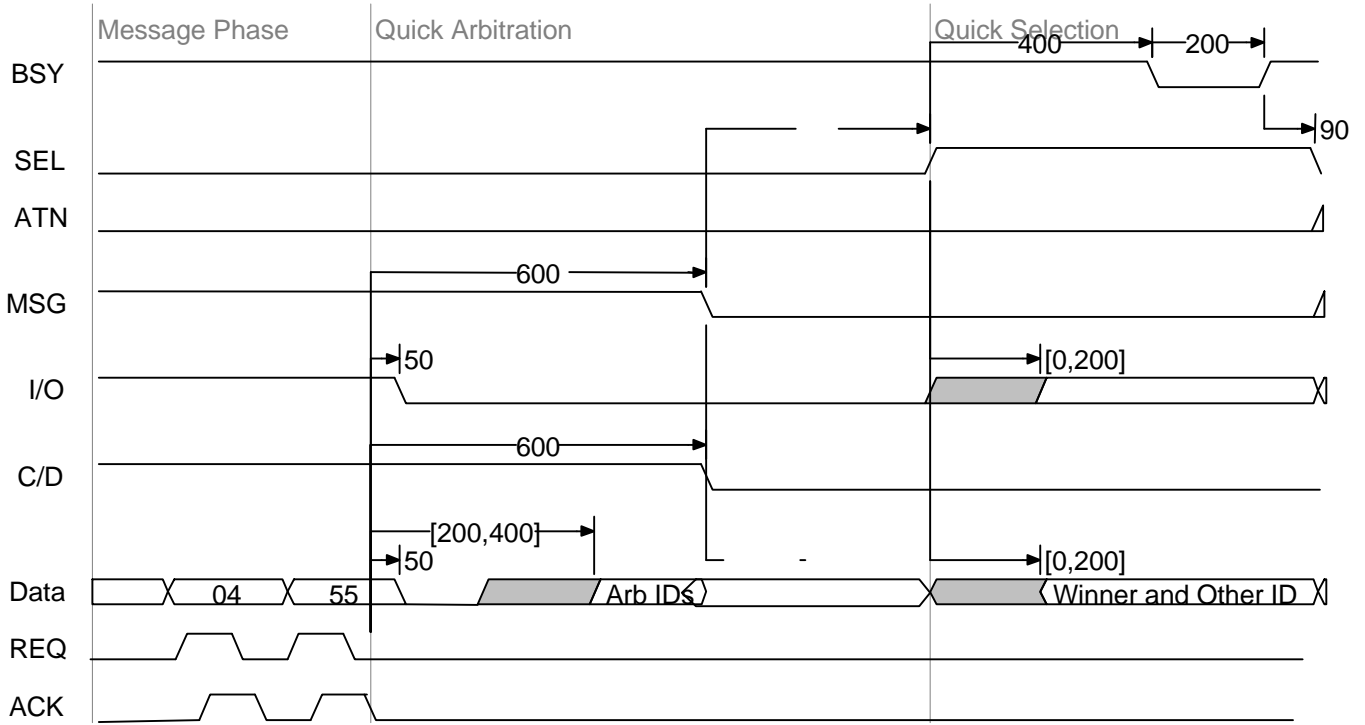


Figure 1 - QAS Protocol

If after the QAS message is issued and there are no devices requiring the bus, no IDs will be presented and the QAS Target giving up the bus will transition the bus to bus free. The subsequent arbitration will be a "normal" arbitration.

Figure 2 defines the QAS protocol for the case where no QAS-capable devices are ready for the bus.

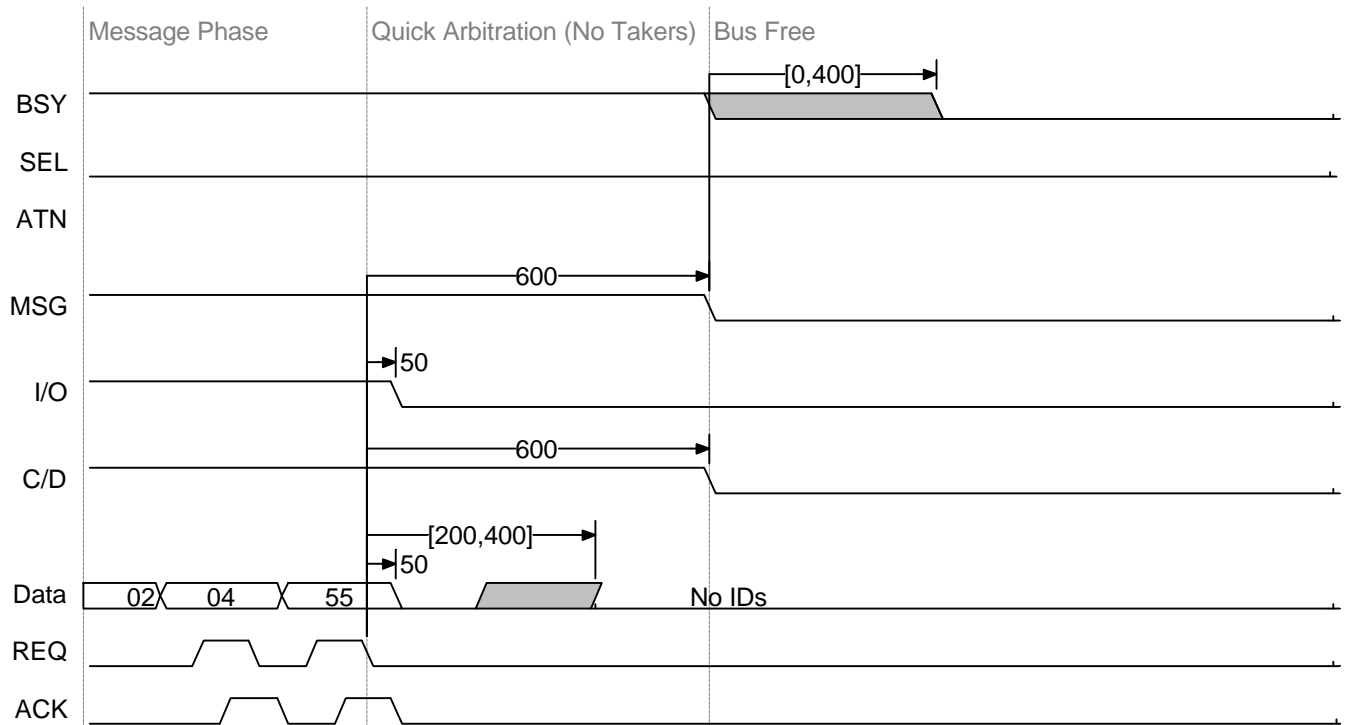


Figure 2 - QAS with no takers

3.1 QAS Initiator Preemption

A mechanism is defined here for Initiators to preempt QAS by asserting ATN along with their respective ID during QAS. When a Target sees ATN asserted, it removes its ID from the bus. QAS continues with only Initiators participating.

Figure 3 illustrates QAS initiator preemption protocol.

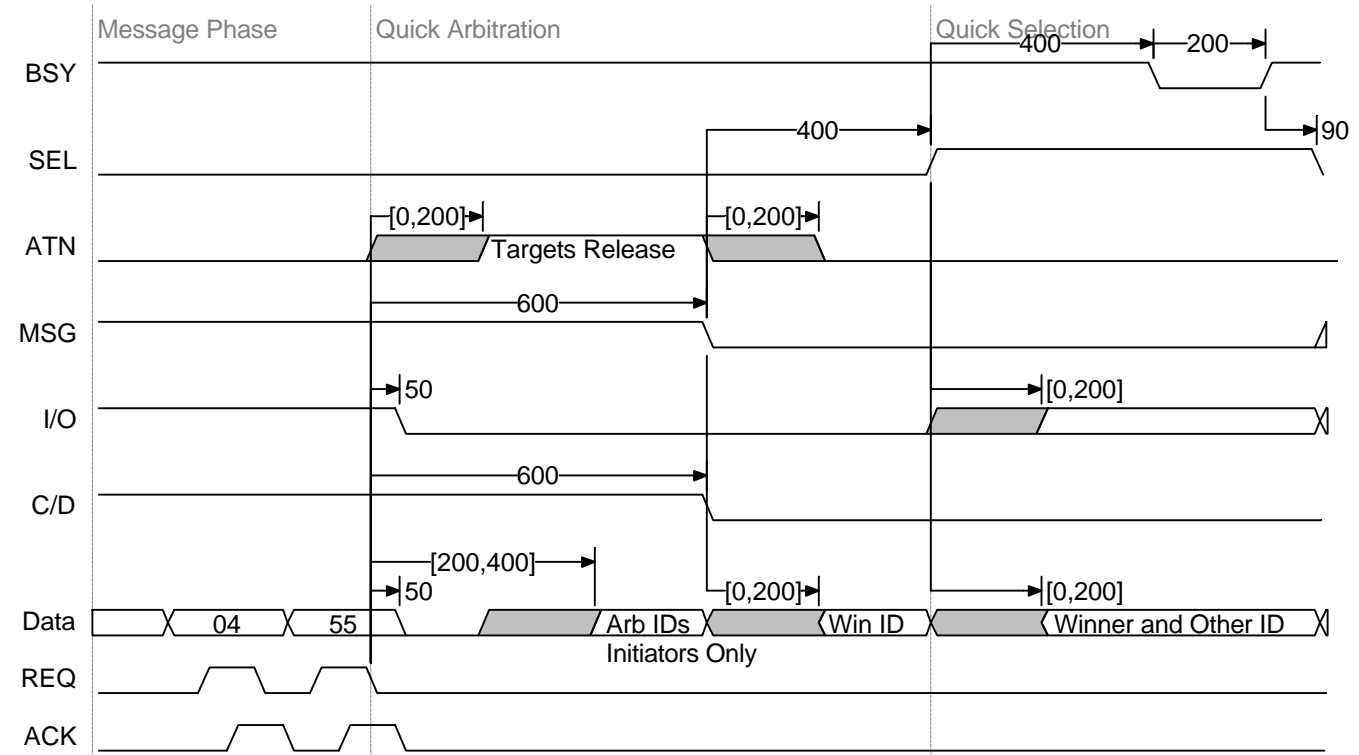


Figure 33 - QAS with initiator preemption