



**To:** Improved SCSI Protocol Ad-Hoc Group  
**From:** Mike Kosco (MKosco@corp.adaptec.com)  
**Subject:** SCSI LFP - Quick Arbitrate & Select Proposal  
**Date:** Tuesday, June 17, 1997

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## 1. Background

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.

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.

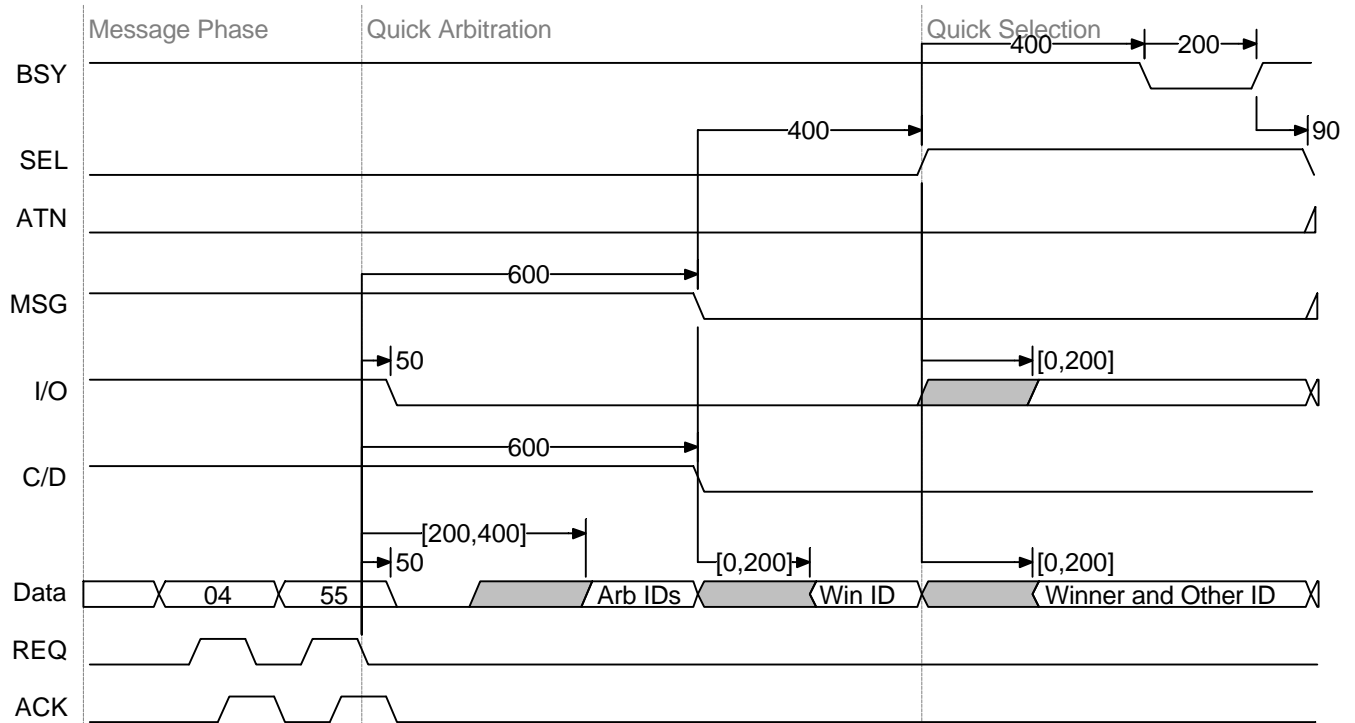
The current QAS Target, after sending the QAS message, negates MSG and drives the winning devices' ID onto the bus.

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.

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 its 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.

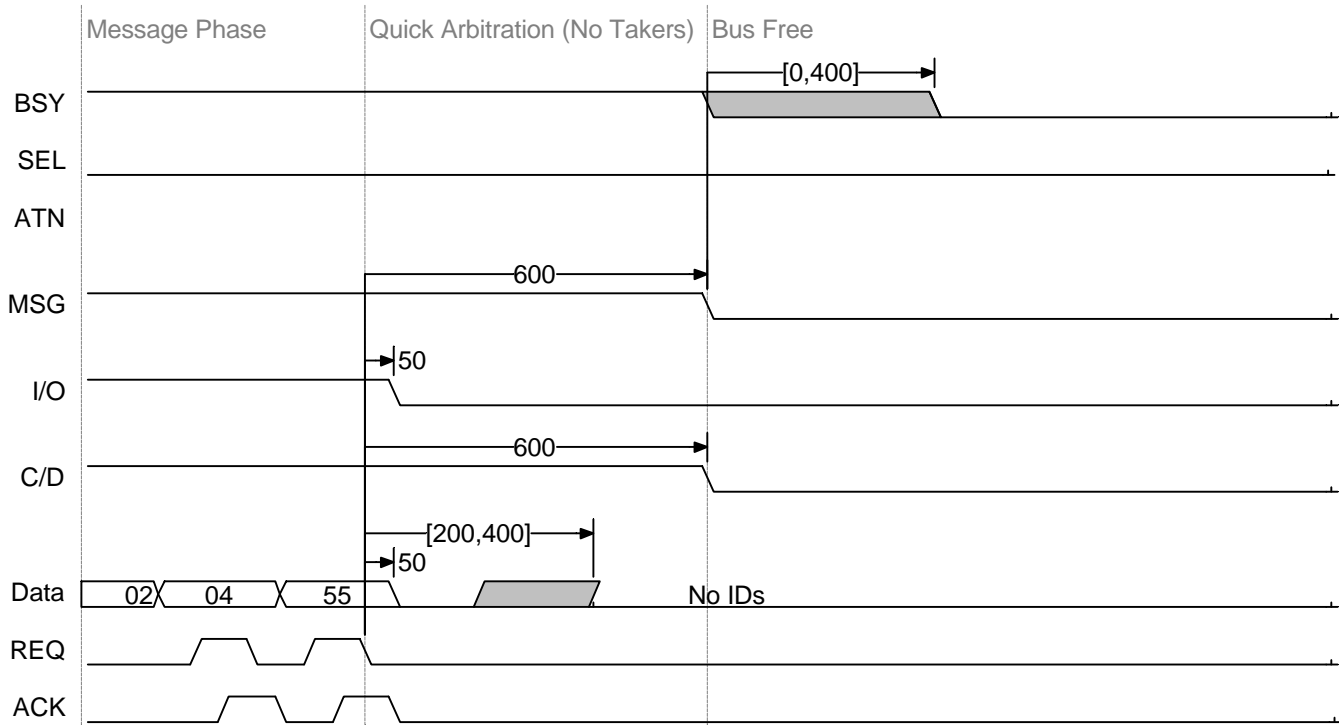


Figure 2 - QAS with no takers

### 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.

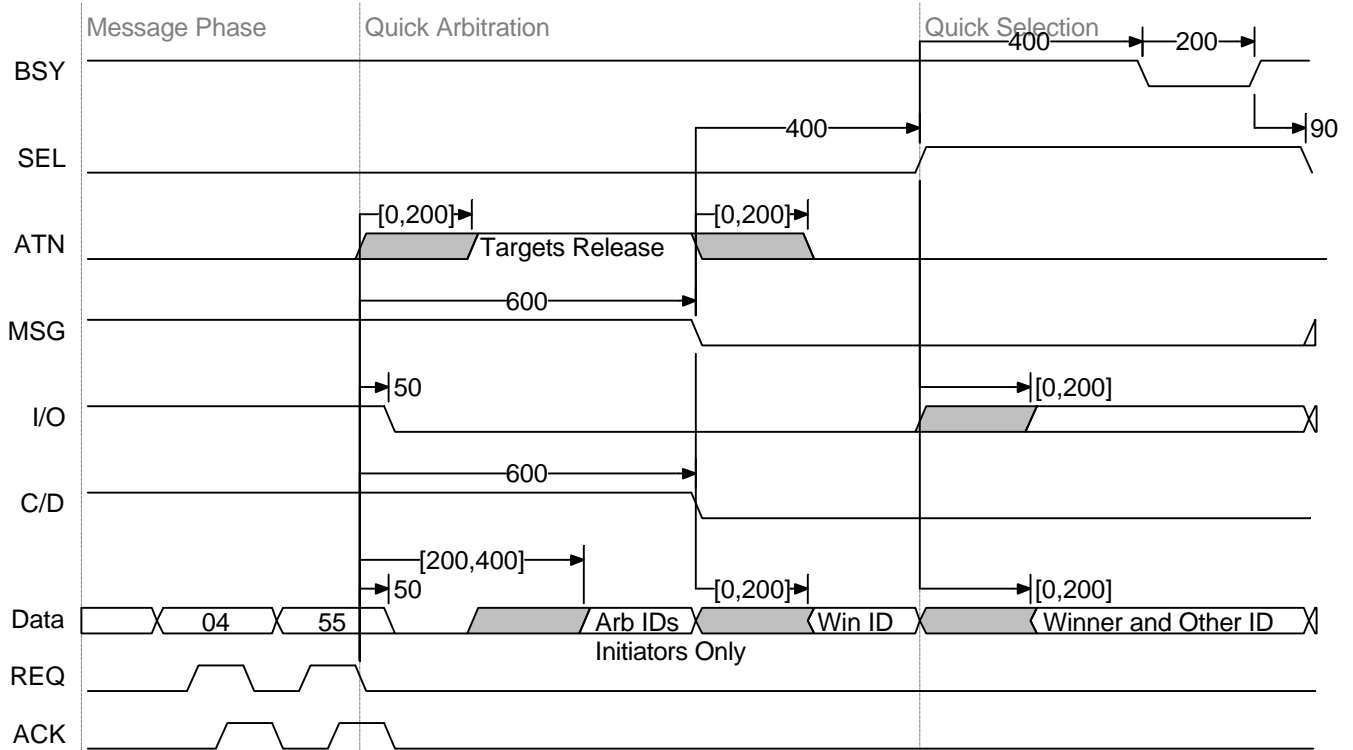


Figure 3 - QAS with initiator preemption

### 4. Fairness

The fairness algorithm grants the bus to the participating QAS target with the next lowest SCSI ID from that of the current QAS target. For example if ID 4 is giving up the bus and IDs 1, 2, 5 & 7 are Quick Arbitrating, ID 2 will be granted the bus.