adaptec

To: **SPI-3 Protocol Study Group**
From: **Mike Kosco (MKosco@corp.adaptec.com)**
Subject: **Quick Arbitrate & Select (QAS) Proposal**
Date: **Tuesday, December 02, 1997**

1. Background

This proposal is for Quick Arbitrate and Select (QAS). It reduces overhead associated with parallel SCSI arbitration during re-selection by allowing targets to pass the bus to other devices on the bus. Initiator preemption allows the host regain control of the bus. The fairness algorythm defined in SPI-2 is used to guarantee bus bandwidth. The proposed protocol improvement is to be compatible and interoperable with the existing parallel SCSI protocol defined in SPI-2.

2. Terminology

QAS - Quick Arbitrate and Select

QAS Device - a SCSI device that supports the QAS protocol

QAS message code - 55h

INFORMATION UNIT TRANSFER REQUEST (IUTR) message (see T10/97-230)

3. Quick Arbitrate and Select (QAS) Protocol

The Quick Arbitrate and Select (QAS) protocol allows the SCSI target ready currently using the bus to transfer control of the bus to another device that is ready to use it. The QAS capability is reported in the INQUIRY data and enabled with a bit in the Control Mode Page. If QAS is enabled the device negotiates its use with each initiator for each power-on cycle using the IUTR message.

If QAS is negotiated then QAS devices snoop the bus to detect the QAS protocol.

QAS protocol begins when the devices on the bus detect an 0x55 as a single-byte message during MESSAGE IN phase. The REQ signal shall be asserted for a minimum of 8 ns to ensure that all devices see the QAS message.

The QAS message may occur following a DISCONNECT or COMMAND COMPLETE message, or following an INFORMATION UNIT phase.

Note: The QAS message is a single-byte message, so if an 0x55 value occurs on the bus (i.e. as a queue tag) and it is not the first byte of a message, the device does not enter QAS protocol.

When the QAS protocol begins all QAS devices ready to use the bus place their SCSI ID's on the bus and wait for the MSG signal to negate.

If QAS protocol begins and there are no devices ready to use bus, no SCSI ID's are asserted and the current device transitions to the BUS FREE phase. The subsequent arbitration is a normal arbitration.

The current QAS Target, after sending the QAS message, negates MSG.

When MSG is detected negated the participating QAS devices remove their IDs from the bus, with the winner determined by the SPI-2 fairness algorithm (see SPI-2 draft).

After removing their IDs, the QAS participants sample the bus to see if their SCSI ID is still asserted on the bus to determine if they have won. The winning device asserts the SEL signal along with it's SCSI ID and the SCSI ID of the device it is re-selecting. When the current device detects the SEL signal asserted, it releases BSY. The winning device now owns the bus.

Figure 1 is an example of the QAS protocol following a DISCONNECT message.

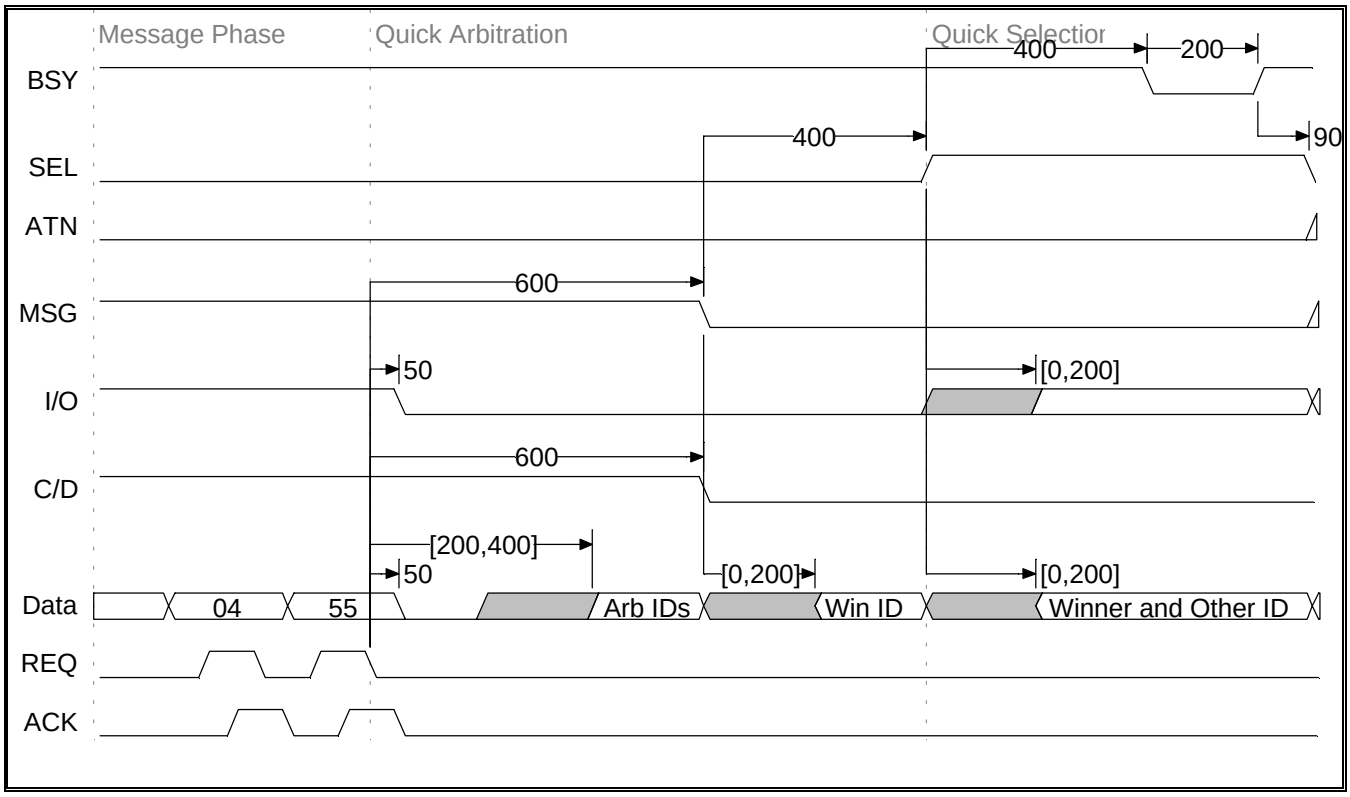

Figure 1 - QAS Protocol

Figure 2 is an example of the QAS protocol for the case where no QAS devices are ready for the bus.

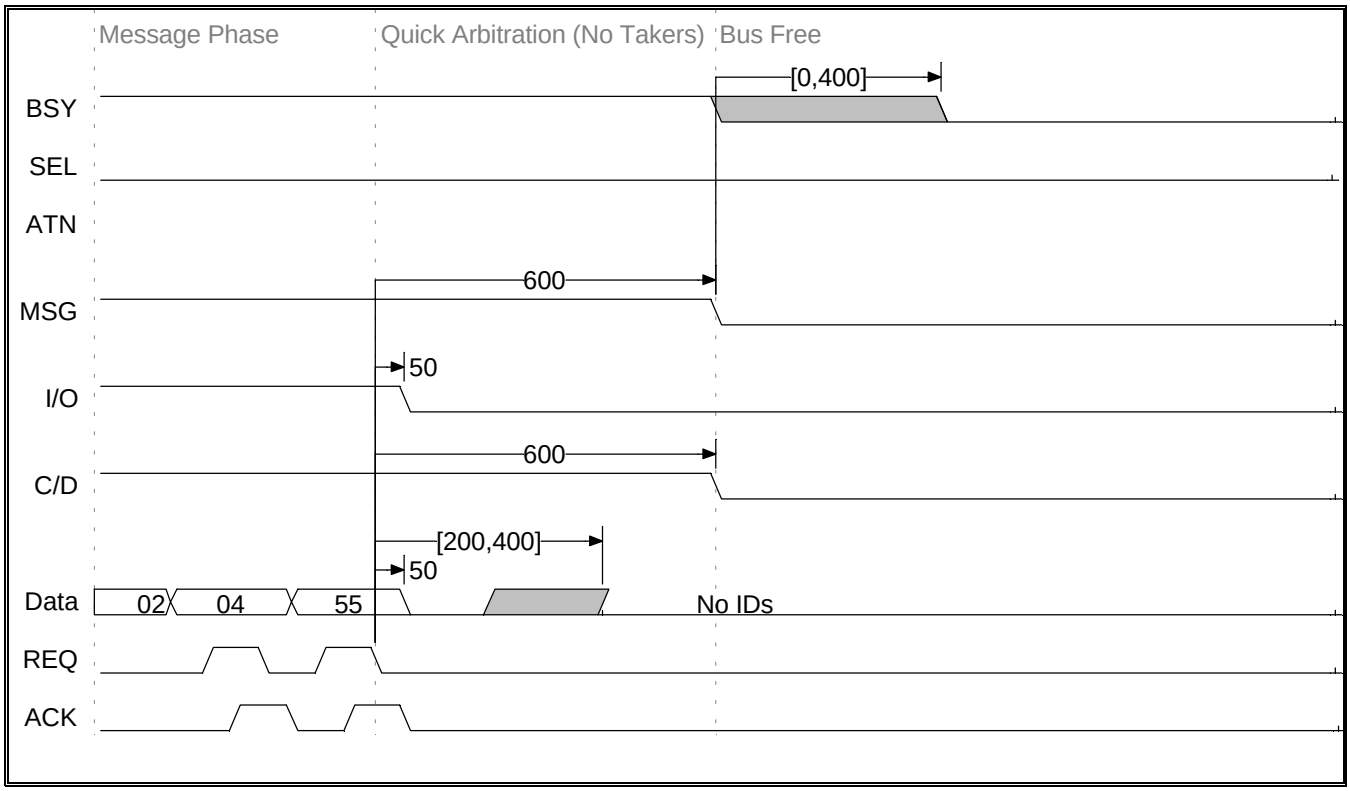

Figure 2 - QAS with no takers

3.1 QAS Initiator Preemption

An initiators may preempt the QAS protocol by asserting the ATN signal along with it's SCSI ID during QAS protocol. A target seeing the ATN signal asserted removes it's SCSI ID from the bus. QAS continues with only initiators participating.

Figure 3 illustrates QAS initiator preemption protocol.

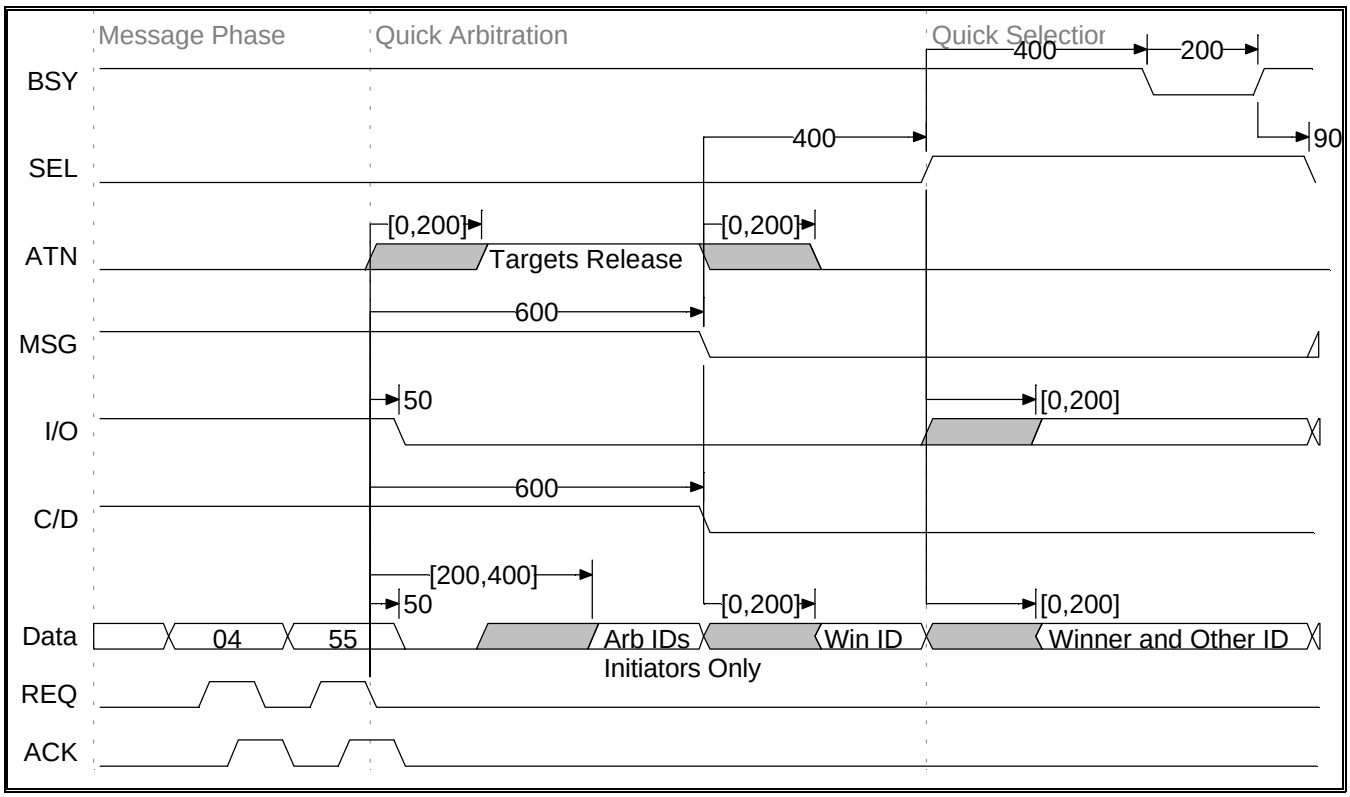

Figure 3 - QAS with initiator preemption