

Discussion of BC Inter-Message Gap and RT Status Response Time

Using ECD54-1553 with PE 0608 with BC/BM on channel 1 and RTs on channel 2.

The Alta RT minimum response time is observed to be:

BCRT	6.5us
RTBC	6.5us
RTRT	6.5us
MC no data	6.5us
MC TX data	6.5us
MC RX data	6.5us

The Alta Protocol Engine (PE) is designed to pass the AS4111 RT Validation Test Plan. Tests like 5.2.1.3.6 (Contiguous Data) require the PE to wait up to 2us to determine if another word is coming. This is why we see a 6us minimum RT response time rather than 4us.

The Alta BC minimum inter-message gap is observed to be:

BCRT – BCRT	6.3us
RTBC – BCRT	6.2us
RTRT – BCRT	6.2us
MC no data – BCRT	6.2us
MC TX data – BCRT	6.2us
MC RX data – BCRT	6.3us
BCAST BCRT – BCRT	9.9us
BCAST RTRT – BCRT	9.9us
BCAST MC no data – BCRT	9.9us
BCAST MC RX data – BCRT	10.6us

The BC firmware requires additional processing at the end of every message to handle things like frame timing, aperiodic messages, sub-frame processing, retries, error handling, etc. This is why the BC cannot get down to a 4us minimum inter-message gap time. Note that you might see longer times if the channel is running as RT(s) as well as the BC.

The Alta BC handles no-response time-out differently than might be expected. The BC waits for the time-out period (14us), then waits for a full word time (20us) to see if a word is coming before declaring a time-out and moving on to the next message, IM gap, etc. This helps with the AS4111 Noise Rejection Test. This looks like:

```
MESSAGE #1 -----  
Time: [2015](69)13:44:33.668.003.740 IM Gap: 77101462.4us  
BUS A - CMD:0020 (0-R-1-32) BCRT  
0000 0000 0000 0000 0000 0000 0000 0000  
0000 0000 0000 0000 0000 0000 0000 0000  
0000 0000 0000 0000 0000 0000 0000 0000  
0000 0000 0000 0000 0000 0000 0000 0000  
Rsp Time NO RESPONSE STS:NO RESPONSE  
ERRORS: NORESP  
Message Time = 660us
```

```
MESSAGE #2 -----  
Time: [2015](69)13:44:33.668.699.820 IM Gap: 38.1us  
BUS A - CMD:0020 (0-R-1-32) BCRT  
0000 0000 0000 0000 0000 0000 0000 0000  
0000 0000 0000 0000 0000 0000 0000 0000  
0000 0000 0000 0000 0000 0000 0000 0000  
0000 0000 0000 0000 0000 0000 0000 0000  
Rsp Time NO RESPONSE STS:NO RESPONSE  
ERRORS: NORESP  
Message Time = 660us
```

```
MESSAGE #3 -----  
Time: [2015](69)13:44:33.669.396.020 IM Gap: 38.2us  
BUS A - CMD:0020 (0-R-1-32) BCRT  
0000 0000 0000 0000 0000 0000 0000 0000  
0000 0000 0000 0000 0000 0000 0000 0000  
0000 0000 0000 0000 0000 0000 0000 0000  
0000 0000 0000 0000 0000 0000 0000 0000  
Rsp Time NO RESPONSE STS:NO RESPONSE  
ERRORS: NORESP  
Message Time = 660us
```

We see an IM Gap of 38us. This is a 14us time-out plus 20us word-time plus the inter-message gap time for the next message (4us). A typical BC could show as little as 14us where we see 38us with the Alta BC.