# Timing Throughput Analysis:

Timing Throughput Analysis is performed on Gateway Application Software. Following sections describe Timing Throughput Analysis for application software.

## 1.1 Gateway Application Software (H108E-856)

Timing throughput analysis is performed on Tasks of Gateway Application Software which are mentioned in HRTP section “Timing Throughput Analysis.”

Steps followed to perform Timing Throughput Analysis for each of the tasks of Gateway Application Software is described in following sections.

**Application Task:**

Steps followed to perform Timing Throughput Analysis for Application task.

1. Test Result is accounted with a help of a counter “tick\_counter\_app” using the gdb script and is logged in ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_nominal.txt’ and ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_worst.txt’.
2. Log file contains value of counter variable “tick\_counter\_app” that is the ticks required for completion of app task.
3. The maximum value of ticks obtained for “tick\_counter\_app” is taken into consideration and converted to Milliseconds i.e. 10 ticks = 1ms.
4. The Time percentage obtained for Application Task is calculated using the below method.

Number of times App task should reschedule within 10000ms, I = 10000/a

Where,

a = Frequency of app task mentioned in SRS H398-SRS-GWY-DRQ-609

Time taken by Application task in % = ((I\*T)/S) \* 100

Where,

1. I = Number of times the Application task should reschedule within the time slice 10000.
2. T = Average Time taken by the Application task to complete execution in milliseconds.
3. S = Time Slice (10000)

Calculation (Nominal):

I = 10, T = 4.291

= ((10\*4.291)/10000) \*100

= 0.4291%

Calculation (Worst Case):

I = 10, T = 3.425

= ((10\* 3.425)/10000) \*100

= 0.3425%

**Init Task:**

Steps followed to perform Timing Throughput Analysis for Init task.

1. Test Result is accounted with a help of a counter “tick\_counter\_init” using the gdb script and is logged in ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_nominal.txt’ and ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_worst.txt’.
2. Log file contains value of counter variable “tick\_counter\_init” that is the ticks required for completion of Init task.
3. The maximum value of ticks obtained for “tick\_counter\_init” is taken into consideration and converted to Milliseconds i.e. 10 ticks = 1ms.
4. The Time percentage obtained for Init Task is calculated using the below method.

Number of times Init task should reschedule within 1000ms, I = 1000/a

Where,

a = Frequency of Init task mentioned in SRS H398-SRS-GWY-DRQ-609

Time taken by Init task in % = ((I\*T)/S) \* 100

Where,

1. I = Number of times the Init task should reschedule within the time slice 10000.
2. T = Average Time taken by the Init task to complete execution in milliseconds.
3. S = Time Slice (10000)

Calculation (Nominal):

I = 2, T = 0.25

= ((2\* 0.25)/10000) \*100

= 0.005%

Calculation (Worst Case):

I = 2, T = 0.123

= ((2\* 1)/10000) \*100

= 0.0024%

**CBIT Task:**

Steps followed to perform Timing Throughput Analysis for CBIT task.

1. Test Result is accounted with a help of a counter “tick\_counter\_cbit” using the gdb script and is logged in ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_nominal.txt’ and ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_worst.txt’.
2. Log file contains value of counter variable “tick\_counter\_cbit” that is the ticks required for completion of CBIT task.
3. The maximum value of ticks obtained for “tick\_counter\_cbit” is taken into consideration and converted to Milliseconds i.e. 10 ticks = 1ms.
4. The Time percentage obtained for CBIT Task is calculated using the below method.

Number of times CBIT task should reschedule within 1000ms, I = 1000/a

Where,

a = Frequency of CBIT task mentioned in SRS H398-SRS-GWY-DRQ-609

Time taken by CBIT task in % = ((I\*T)/S) \* 100

Where,

1. I = Number of times the CBIT task should reschedule within the time slice 10000.
2. T = Average Time taken by the CBIT task to complete execution in milliseconds.
3. S = Time Slice (10000)

Calculation (Nominal):

I = 10, T = 10.498

= ((10\* 9.930)/10000) \*100

= 0.99%

Calculation (Worst Case):

I = 10, T = 10.090

= ((10\* 10.090)/10000) \*100

= 1.009%

**Sound Task:**

Steps followed to perform Timing Throughput Analysis for Sound task.

1. Test Result is accounted with a help of a counter “tick\_counter\_sound” using the gdb script and is logged in ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_nominal.txt’ and ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_worst.txt’.
2. Log file contains value of counter variable “tick\_counter\_sound” that is the ticks required for completion of Sound task.
3. The maximum value of ticks obtained for “tick\_counter\_sound” is taken into consideration and converted to Milliseconds i.e. 10 ticks = 1ms.
4. The Time percentage obtained for Sound Task is calculated using the below method.

Number of times Sound task should reschedule within 1000ms, I = 1000/a

Where,

a = Frequency of Sound task mentioned in SRS H398-SRS-GWY-DRQ-609

Time taken by Sound task in % = ((I\*T)/S) \* 100

Where,

1. I = Number of times the Sound task should reschedule within the time slice 10000.
2. T = Average Time taken by the Sound task to complete execution in milliseconds.
3. S = Time Slice (10000)

Calculation(Nominal):

I = 100, T = 0.2638

= ((100\* 0.2638)/10000) \*100

= 0.2638%

Calculation (Worst Case):

I = 100, T = 0.6

= ((100\* 0.6)/10000) \*100

= 0.6%

**A825 Communication Task 1:**

Steps followed to perform Timing Throughput Analysis for A825 Communication task 1.

1. Test Result is accounted with a help of a counter “tick\_counter\_a825\_1” using the gdb script and is logged in ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_nominal.txt’ and ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_worst.txt’.
2. Log file contains value of counter variable “tick\_counter\_a825\_1” that is the ticks required for completion of A825 Communication task 1.
3. The maximum value of ticks obtained for “tick\_counter\_a825\_1” is taken into consideration and converted to Milliseconds i.e. 10 ticks = 1ms.
4. The Time percentage obtained for A825 Communication task 1 is calculated using the below method.

Number of times A825 Communication task 1 should reschedule within 1000ms, I = 1000/a

Where,

a = Frequency of A825 Communication task 1 mentioned in SRS H398-SRS-GWY-DRQ-609

Time taken by A825 Communication task 1 in % = ((I\*T)/S) \* 100

Where,

1. I = Number of times the A825 Communication task 1 should reschedule within the time slice 10000.
2. T = Average Time taken by the A825 Communication task 1 to complete execution in milliseconds.
3. S = Time Slice (10000)

Calculation (Nominal):

I = 100, T = 1.652

= ((100\* 1.652)/10000) \*100

= 1.652%

Calculation (Worst Case):

I = 100, T = 0.847

= ((101\* 0.847)/10000) \*100

= 0.847%

**A825 Communication Task 2:**

Steps followed to perform Timing Throughput Analysis for A825 Communication task 2.

1. Test Result is accounted with a help of a counter “tick\_counter\_a825\_1” using the gdb script and is logged in ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_nominal.txt’ and ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_worst.txt’.
2. Log file contains value of counter variable “tick\_counter\_a825\_2” that is the ticks required for completion of A825 Communication task 2.
3. The maximum value of ticks obtained for “tick\_counter\_a825\_2” is taken into consideration and converted to Milliseconds i.e. 10 ticks = 1ms.
4. The Time percentage obtained for A825 Communication task 2 is calculated using the below method.

Number of times A825 Communication task 2 should reschedule within 1000ms, I = 1000/a

Where,

a = Frequency of A825 Communication task 2 mentioned in SRS H398-SRS-GWY-DRQ-609

Time taken by A825 Communication task 2 in % = ((I\*T)/S) \* 100

Where,

1. I = Number of times the A825 Communication task 2 should reschedule within the time slice 10000.
2. T = Average Time taken by the A825 Communication task 2 to complete execution in milliseconds.
3. S = Time Slice (10000)

Calculation (Nominal):

I = 100, T = 0.847

= ((100\* 0.847)/10000) \*100

= 0.847%

Calculation (Worst Case):

I = 100, T = 0.927

= ((100\* 0.927)/10000) \*100

= 0.927%

**A429 Task:**

Steps followed to perform Timing Throughput Analysis for A429 task.

1. Test Result is accounted with a help of a counter “tick\_counter\_a429” using the gdb script and is logged in ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_nominal.txt’ and ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_worst.txt’.
2. Log file contains value of counter variable “tick\_counter\_a429” that is the ticks required for completion of A429 task.
3. The maximum value of ticks obtained for “tick\_counter\_a429” is taken into consideration and converted to Milliseconds i.e. 10 ticks = 1ms.
4. The Time percentage obtained for A429 Task is calculated using the below method.

Number of times A429 task should reschedule within 1000ms, I = 1000/a

Where,

a = Frequency of A429 task mentioned in SRS H398-SRS-GWY-DRQ-609

Time taken by A429 task in % = ((I\*T)/S) \* 100

Where,

1. I = Number of times the A429 task should reschedule within the time slice 10000.
2. T = Average Time taken by the A429 task to complete execution in milliseconds.
3. S = Time Slice (10000)

Calculation (Nominal):

I = 100, T = 6.513

= ((100\* 6.513)/10000) \*100

= 6.513%

Calculation (Worst Case):

I = 100, T = 7.083

= ((100\* 7.083)/10000) \*100

= 7.083%

**A429 Output Task:**

Steps followed to perform Timing Throughput Analysis for A429 Output task.

1. Test Result is accounted with a help of a counter “tick\_counter\_a429output” using the gdb script and is logged in ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_nominal.txt’ and ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_worst.txt’.
2. Log file contains value of counter variable “tick\_counter\_a429output” that is the ticks required for completion of A429 Output task.
3. The maximum value of ticks obtained for “tick\_counter\_a429output” is taken into consideration and converted to Milliseconds i.e. 10 ticks = 1ms.
4. The Time percentage obtained for A429 Output Task is calculated using the below method.

Number of times A429 Output task should reschedule within 1000ms, I = 1000/a

Where,

a = Frequency of A429 Output task mentioned in SRS H398-SRS-GWY-DRQ-609

Time taken by A429 Output task in % = ((I\*T)/S) \* 100

Where,

1. I = Number of times the A429 Output task should reschedule within the time slice 10000.
2. T = Average Time taken by the A429 Output task to complete execution in milliseconds.
3. S = Time Slice (10000)

Calculation (Nominal):

I = 100, T = 1.680

= ((100\* 1.680)/10000) \*100

= 1.68%

Calculation (Worst Case):

I = 100, T 1.949

= ((100\* 1.949)/10000) \*100

= 1.949%

**ETI Timer Task:**

Steps followed to perform Timing Throughput Analysis for ETI Timer task.

1. Test Result is accounted with a help of a counter “tick\_counter\_eti” using the gdb script and is logged in ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_nominal.txt’ and ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_worst.txt’.
2. Log file contains value of counter variable “tick\_counter\_eti” that is the ticks required for completion of ETI Timer task.
3. The maximum value of ticks obtained for “tick\_counter\_eti” is taken into consideration and converted to Milliseconds i.e. 10 ticks = 1ms.
4. The Time percentage obtained for ETI Timer Task is calculated using the below method.

Number of times ETI Timer task should reschedule within 1000ms, I = 1000/a

Where,

a = Frequency of ETI Timer task mentioned in SRS H398-SRS-GWY-DRQ-609

Time taken by ETI Timer task in % = ((I\*T)/S) \* 100

Where,

1. I = Number of times the ETI Timer task should reschedule within the time slice 10000.
2. T = Average Time taken by the ETI Timer task to complete execution in milliseconds.
3. S = Time Slice (10000)

Calculation (Nominal):

I = 10, T = 0.208

= ((10\* 0.208)/10000) \*100

= 0.0208 %

Calculation (Worst Case):

I = 10, T = 0.021

= ((10\* 0.021)/10000) \*100

= 0.0021%

**Logic Task:**

Steps followed to perform Timing Throughput Analysis for Logic task.

1. Test Result is accounted with a help of a counter “tick\_counter\_logic” using the gdb script and is logged in ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_nominal.txt’ and ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_worst.txt’.
2. Log file contains value of counter variable “tick\_counter\_logic” that is the ticks required for completion of Logic task.
3. The maximum value of ticks obtained for “tick\_counter\_logic” is taken into consideration and converted to Milliseconds i.e. 10 ticks = 1ms.
4. The Time percentage obtained for Logic Task is calculated using the below method.

Number of times Logic task should reschedule within 1000ms, I = 1000/a

Where,

a = Frequency of Logic task mentioned in SRS H398-SRS-GWY-DRQ-609

Time taken by Logic task in % = ((I\*T)/S) \* 100

Where,

1. I = Number of times the Logic task should reschedule within the time slice 10000.
2. T = Average Time taken by the Logic task to complete execution in milliseconds.
3. S = Time Slice (10000)

Calculation (Nominal):

I = 100, T = 10.819

= ((100\* 10.819)/10000) \*100

10.819 %

Calculation (Worst Case):

I = 100, T = 12.643

= ((100\* 12.643)/10000) \*100

= 12.643%

**Logic Task Com4:**

Steps followed to perform Timing Throughput Analysis for Logic Task Com4.

1. Test Result is accounted with a help of a counter “tick\_counter\_logicCom4” using the gdb script and is logged in ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_nominal.txt’ and ‘TR\_HSIT\_H398\_GWY\_Timing\_Analysis\_worst.txt’.
2. Log file contains value of counter variable “tick\_counter\_logicCom4” that is the ticks required for completion of Logic Task Com4.
3. The maximum value of ticks obtained for “tick\_counter\_logicCom4” is taken into consideration and converted to Milliseconds i.e. 10 ticks = 1ms.
4. The Time percentage obtained for Logic Task Com4 is calculated using the below method.

Number of times Logic Task Com4 should reschedule within 1000ms, I = 1000/a

Where,

a = Frequency of Logic Task Com4 mentioned in SRS H398-SRS-GWY-DRQ-609

Time taken by Logic Task Com4 in % = ((I\*T)/S) \* 100

Where,

1. I = Number of times the Logic Task Com4 should reschedule within the time slice 10000.
2. T = Average Time taken by the Logic Task Com4 to complete execution in milliseconds.
3. S = Time Slice (10000)

Calculation (Nominal):

I = 1000, T = 0.8194

= ((1000\* 0.8194)/10000) \*100

= 8.194 %

Calculation (Worst Case):

I = 1000, T = 0.9527

= ((1000\* 0.9527)/10000) \*100

= 9.527%

# 2. Timing Throughput Analysis Result

## 2.1 Gateway Application Software (H108E-856)

Summary of Timing Throughput Analysis Results for each task of Gateway Application Software (H108E-856) for Nominal Case

|  |  |  |  |
| --- | --- | --- | --- |
| **SL No** | **Task** | **Task Percentage (Nominal)** | **Task Percentage (Worst Case)** |
| 1 | Application Task | 0.429 % | 0.3425 % |
| 2 | Init Task | 0.005 % | 0.0024 % |
| 3 | CBIT Task | 0.9930 % | 1.0090 % |
| 4 | Sound Task | 0.2638 % | 0.6% |
| 5 | A825 Communication Task 1 | 1.6527 % | 0.8472 % |
| 6 | A825 Communication Task 2 | 0.8472 % | 0.9272 % |
| 7 | A429 Task | 6.5138 % | 7.0836 % |
| 8 | A429 Output Task | 1.6805 % | 1.9490 % |
| 9 | ETI Timer Task | 0.0208 % | 0.0021 % |
| 10 | Logic Task | 10.8194 % | 12.6436 % |
| 11 | Logic Task Com4 | 8.1944 % | 9.5272 % |
|  | Total Task Time in percentage | 31.420 % | 34.934% |
|  | Total Idle Time in percentage | 68.58% | 65.06% |

**Conclusion**:

A) The total time taken by the processor to complete the entire task’s execution for nominal case is: 31.420 % and worst case 34.934%.

B) The total idle time of the processor is for nominal case is: 68.58 % and for worst case is 65.06%

Note:

1. Maximum Time (T) taken by each task to complete execution is calculated by taking average of all the ticks of that particular task.