

Media Clock Stabilization Time – Part 2

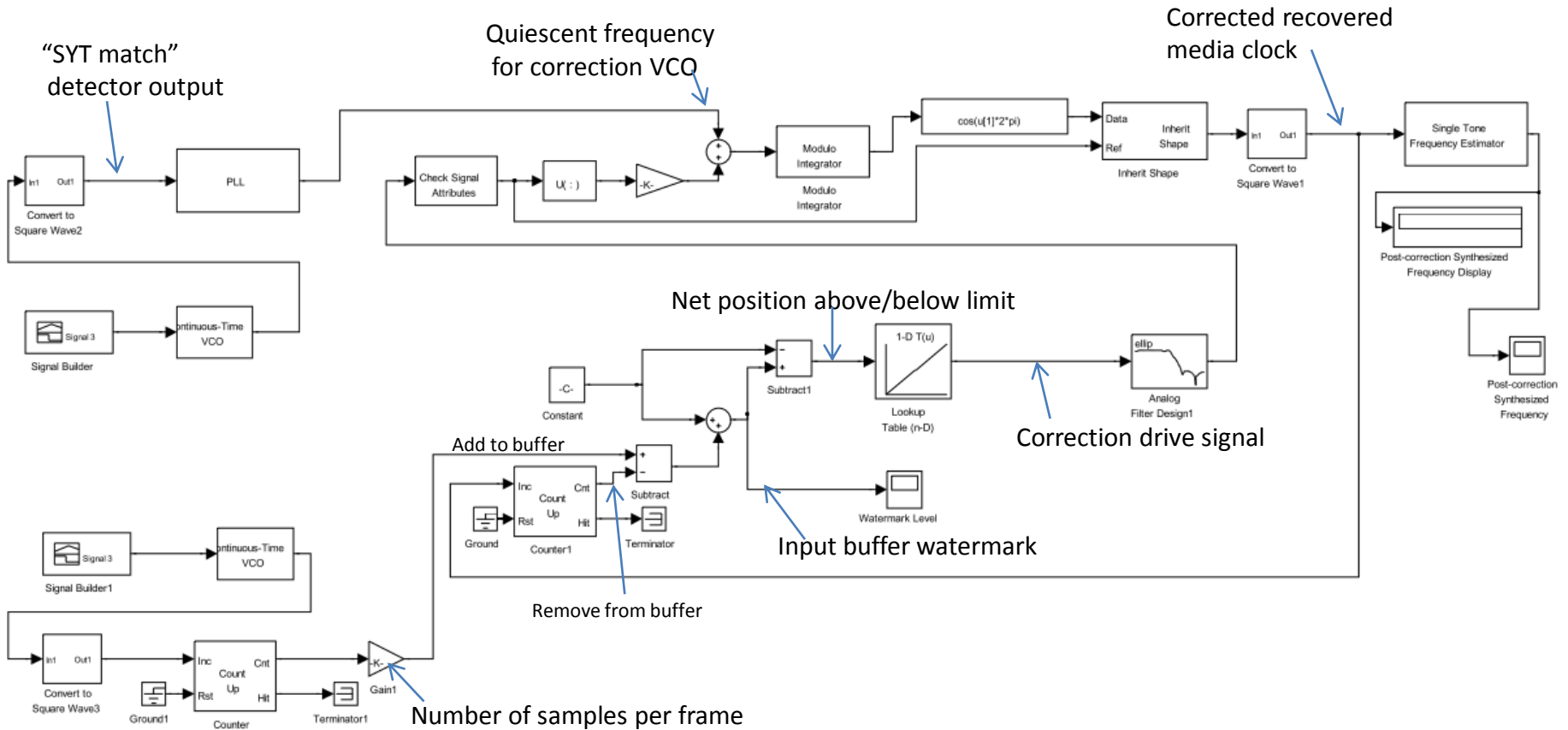
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Initial Results

Model included...

1. Media clock stream input,
2. Media stream input,
3. Drift of input rates
4. Correction to recovered media clock based on input sample buffer watermark
5. Focus on startup behavior

Model of system:



Initial Results

Look up table used in calculating the correction drive signal:

Figure 1. Lookup Table (n-D)

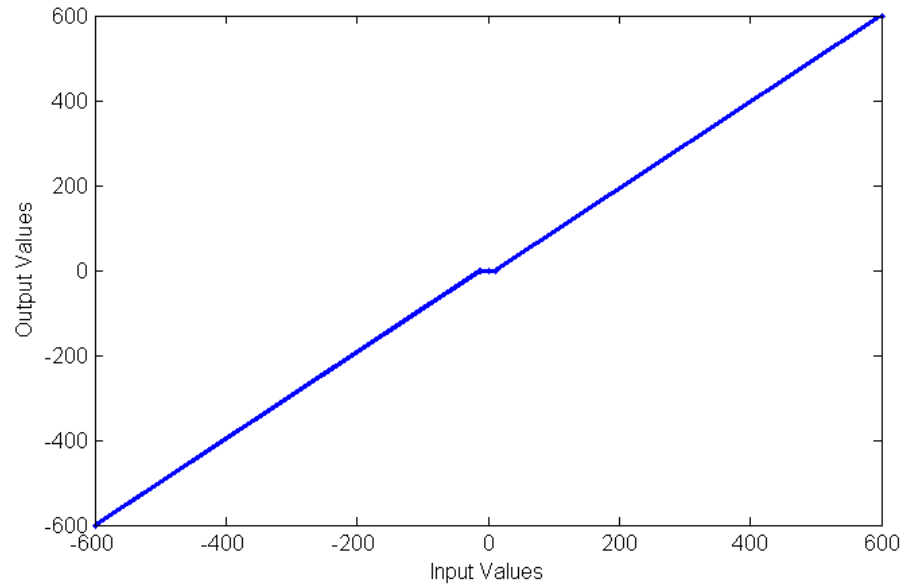


Table 1. Lookup Table (n-D) (:,:)

-600	-600
-13	-1
-12	0
0	0
1	0
12	0
13	1
600	600

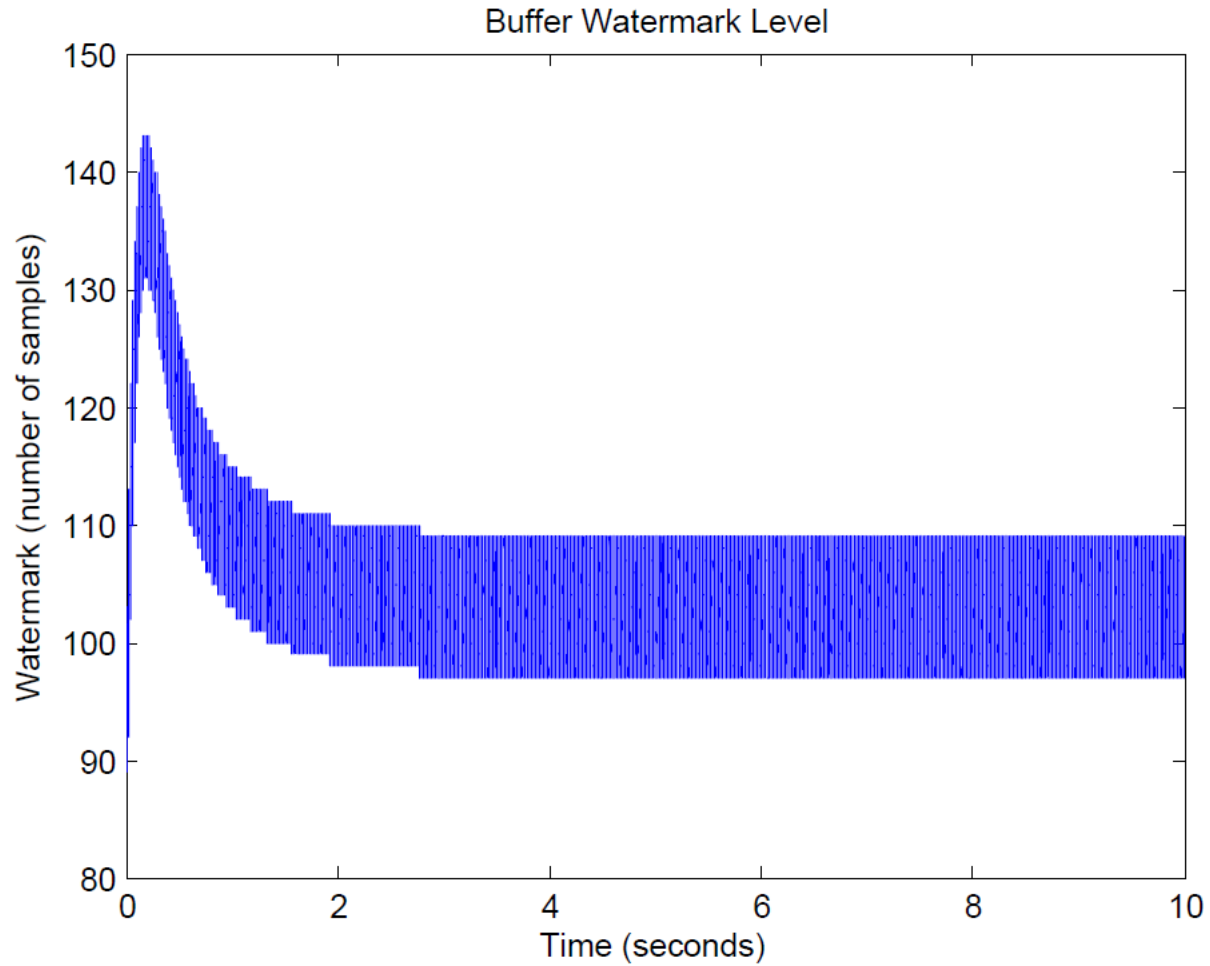
Configuration

1. 48 kHz Nominal sample rate
2. 4 kHz Media stream update
3. 100 Hz Media clock stream update rate
4. 10 Second simulation
5. Both media stream and media clock stream drift at 1 PPM/second (increasing)
6. PLL Butterworth filter: 6.6 Hz/2nd order
7. Elliptic filter (correction): 60 dB attenuation/2 dB passbandripple
8. PLL VCO quiescent frequency = 48005 Hz
9. Number of audio samples per frame = 12
10. Number of samples buffered at startup = 96
11. Watermark limits are +/- 12
12. Relative Tolerance: 1e-6
13. PLL Gain: -1
14. PLL VCO Sensitivity: 1000Hz./Volt
15. Correction VCO Sensitivity: 10Hz./Volt

Use Cases

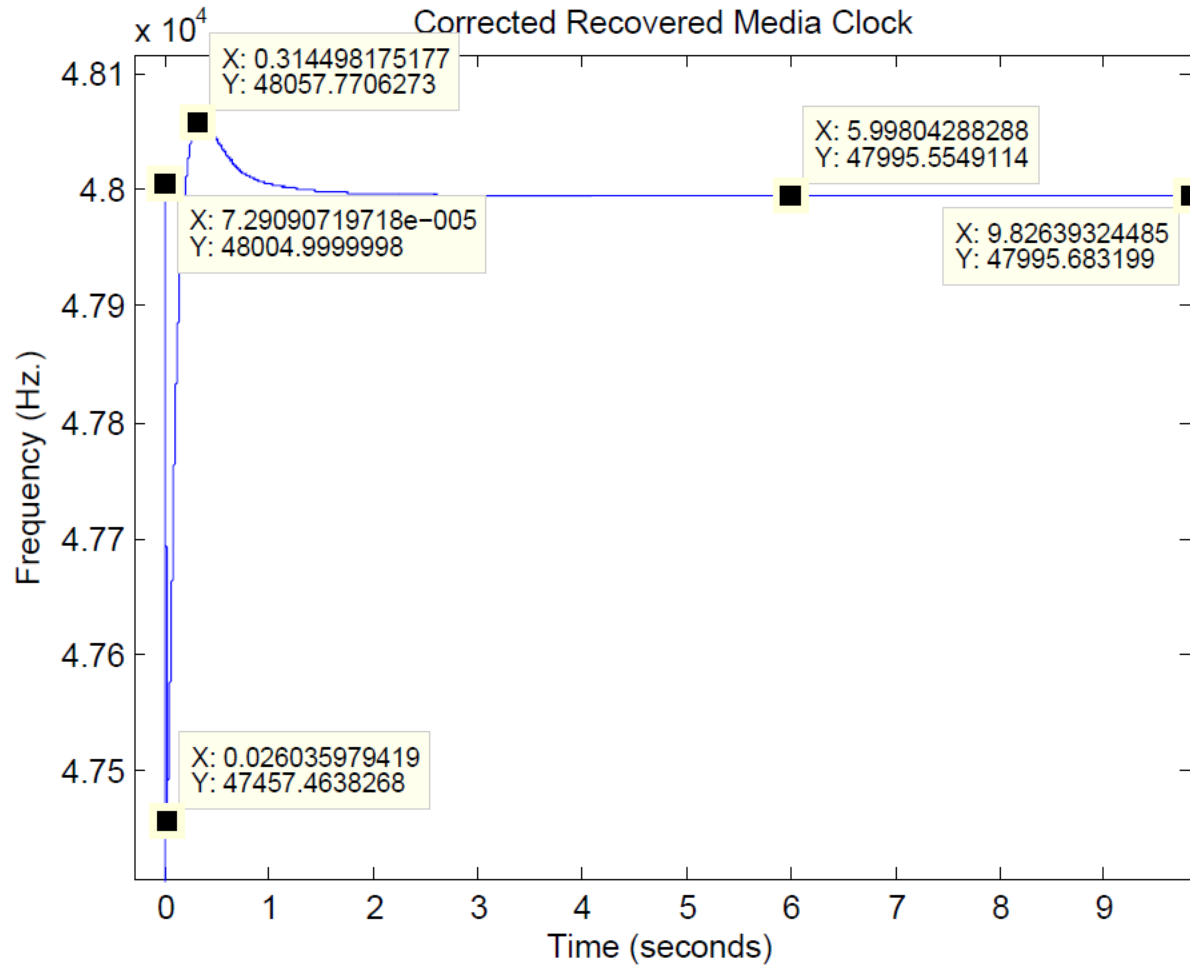
1. Media stream and media clock stream frequencies are 200 PPM lower (not including drift) than the PLL VCO quiescent frequency. Elliptic filter used in correction and Butterworth filter used in PLL.(19)
2. Media stream and media clock stream frequencies are 10000 PPM lower (not including drift) than the PLL VCO quiescent frequency. Elliptic filter used in correction and Butterworth filter used in PLL.(18)

Results: Use Case 1



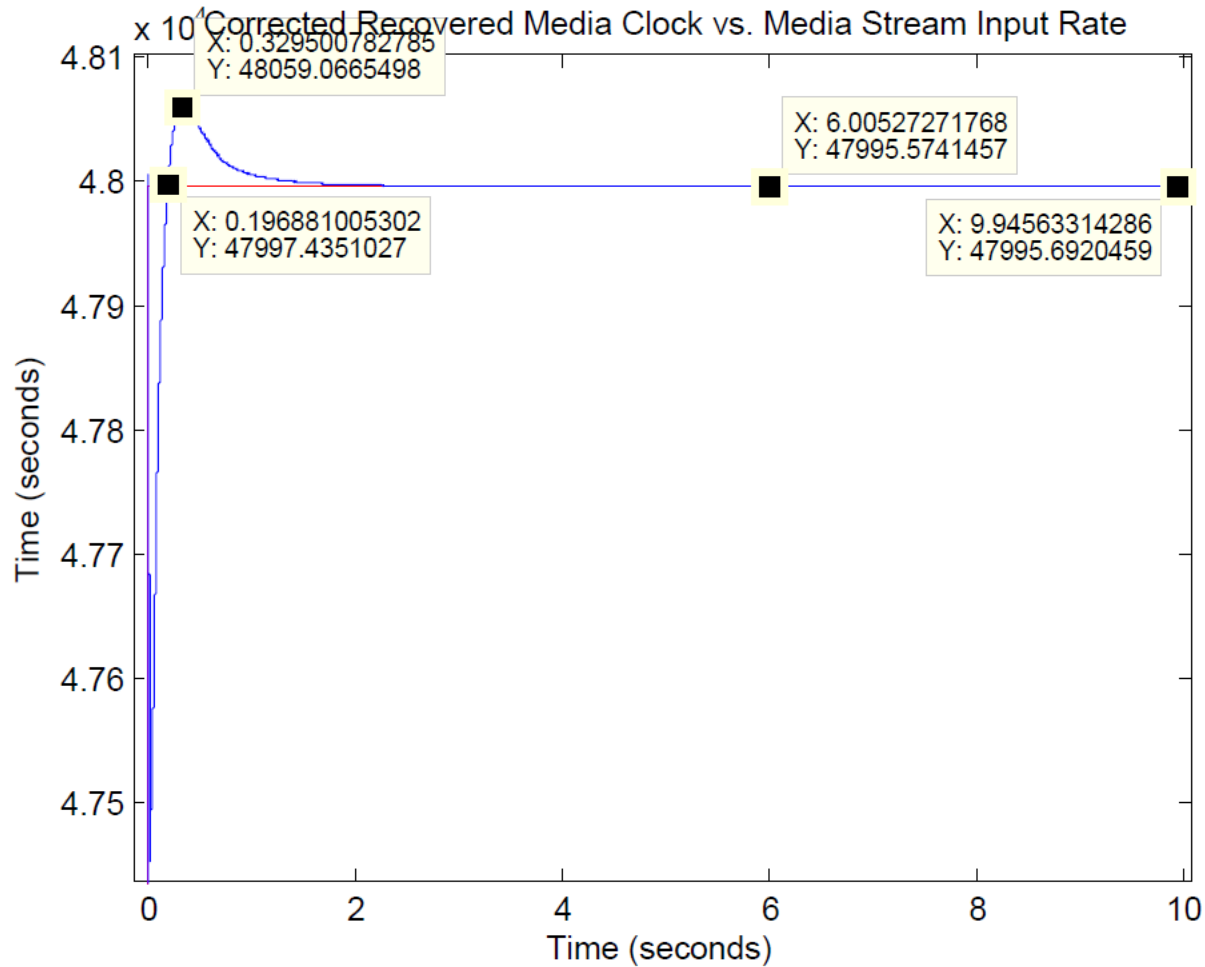
Initial Results

Results: Use Case 1



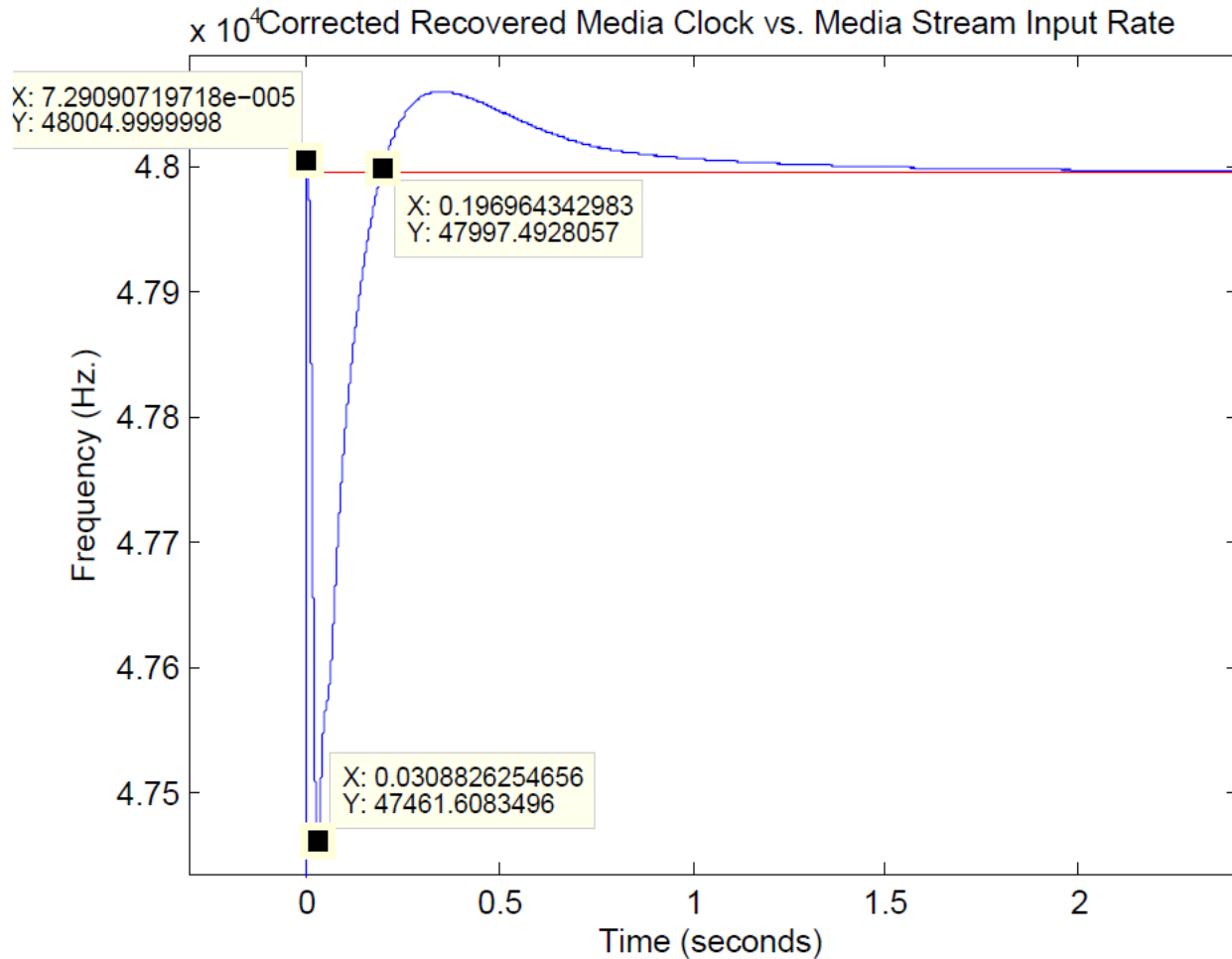
Initial Results

Results: Use Case 1

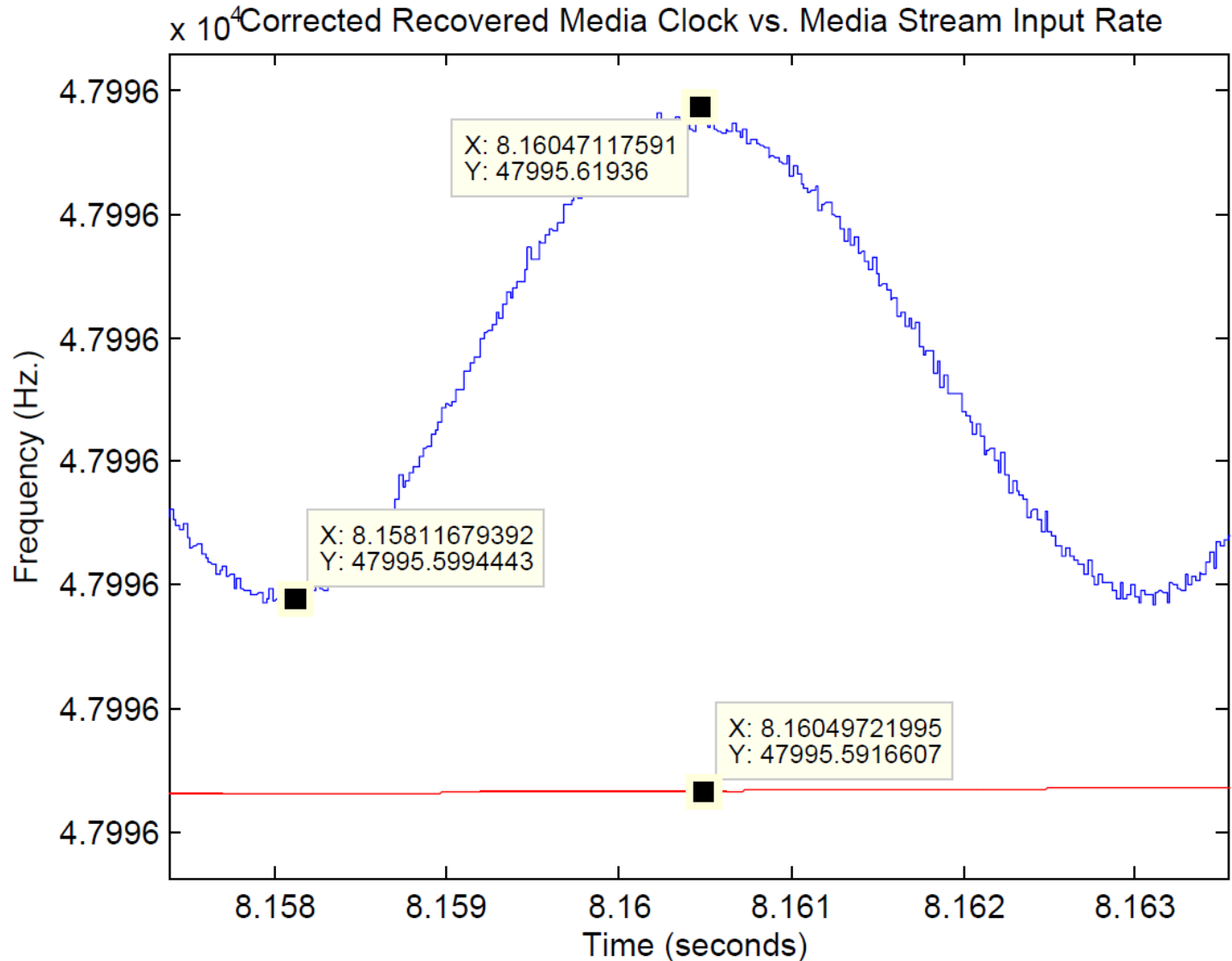


Initial Results

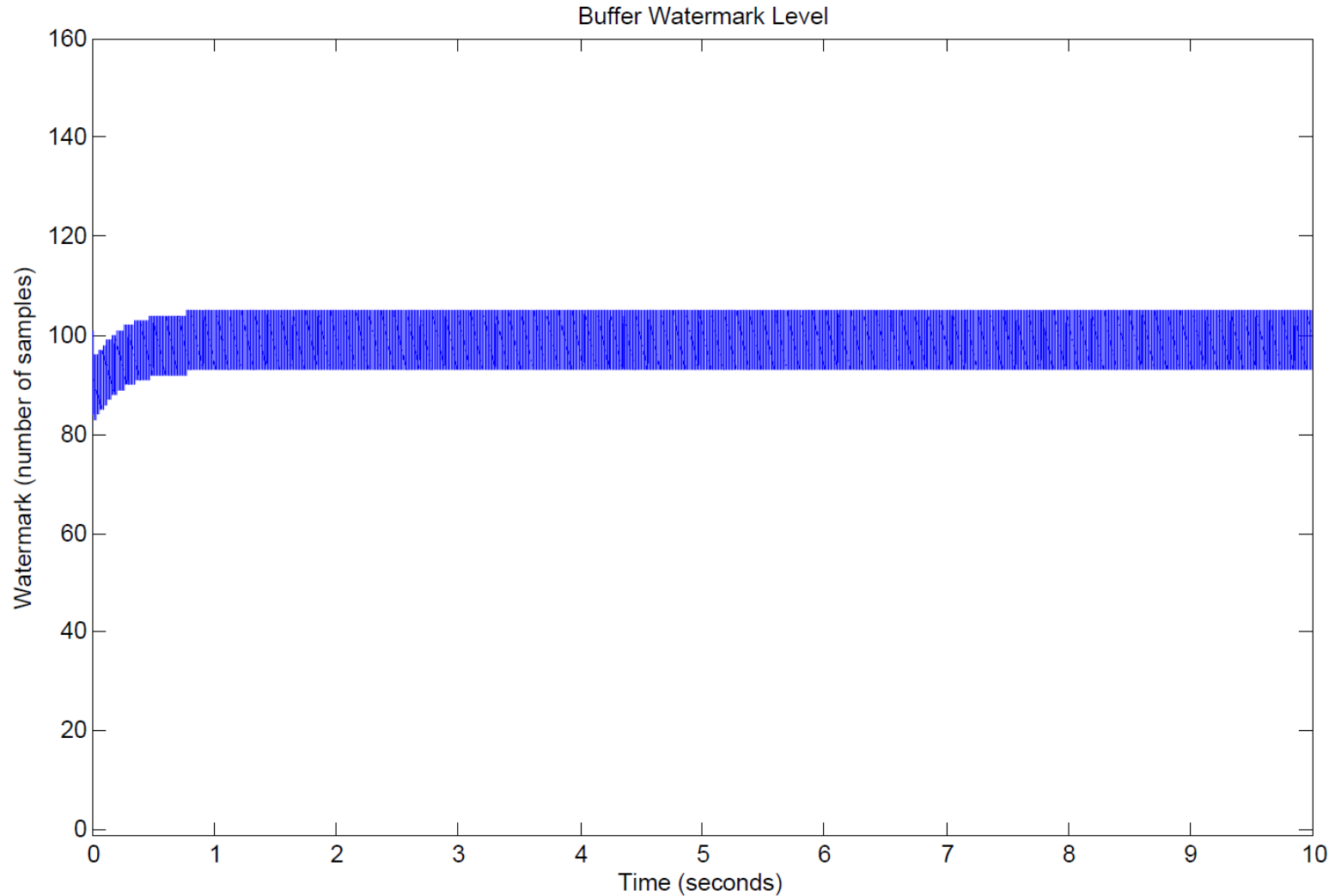
Results: Use Case 1



Results: Use Case 1

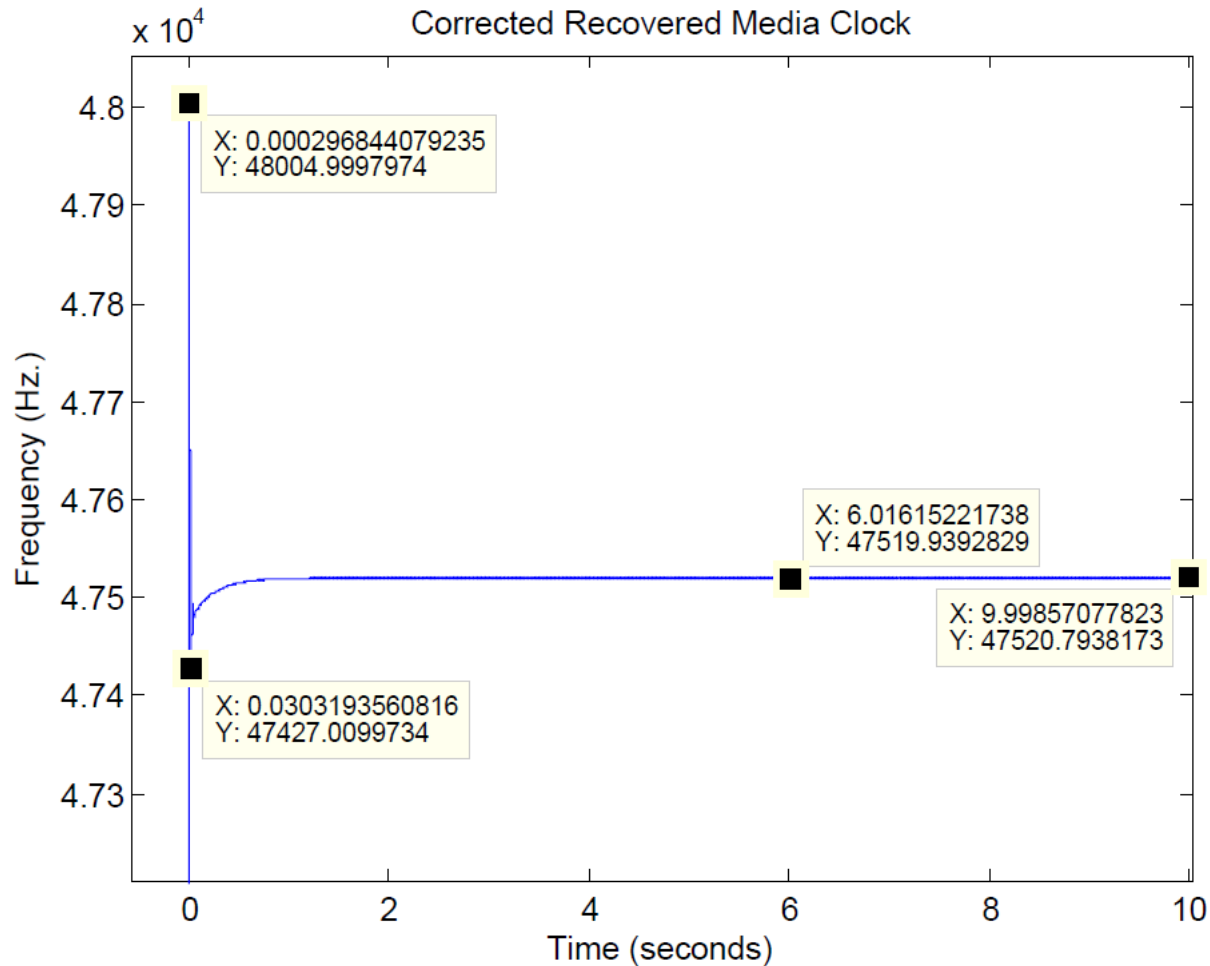


Results: Use Case 2



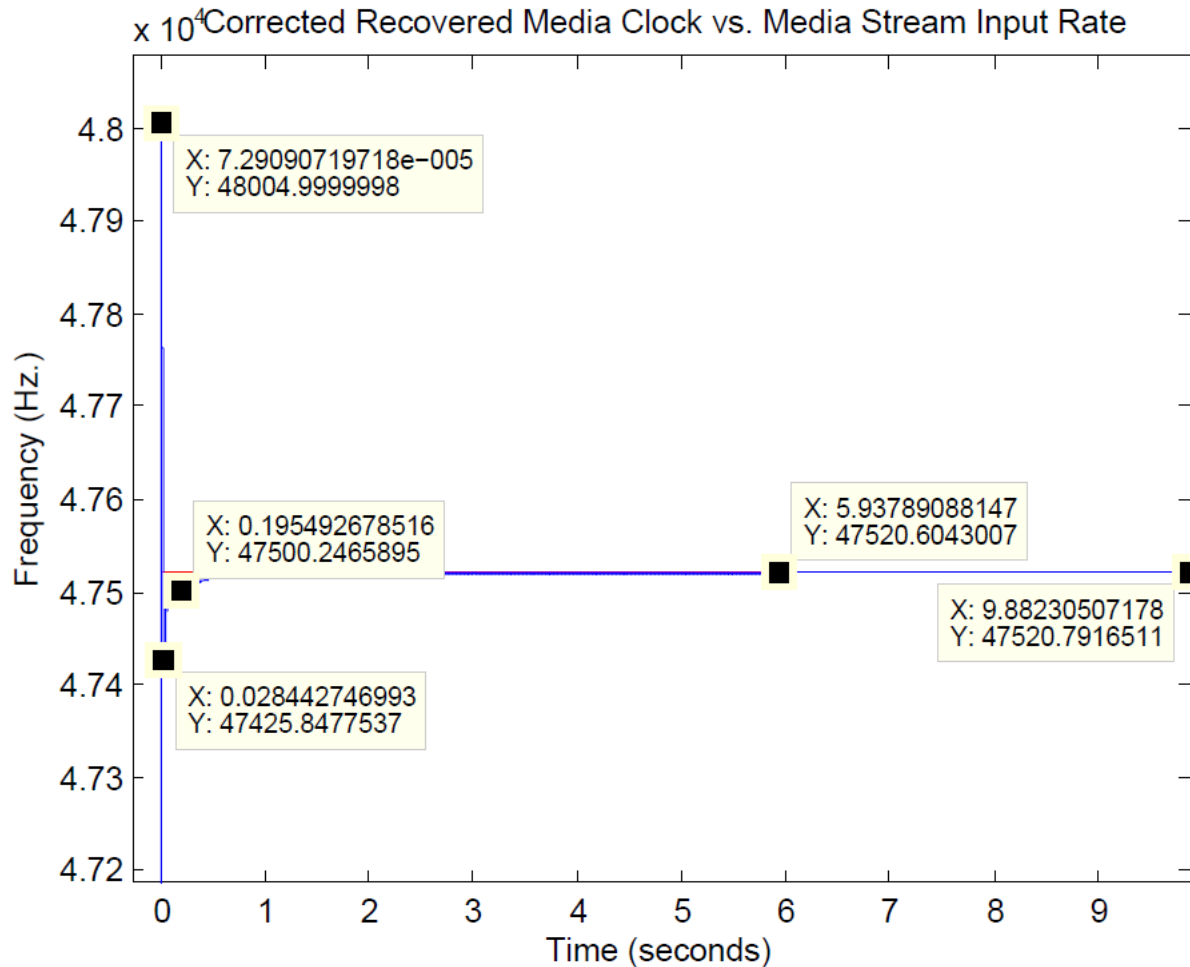
Initial Results

Results: Use Case 2

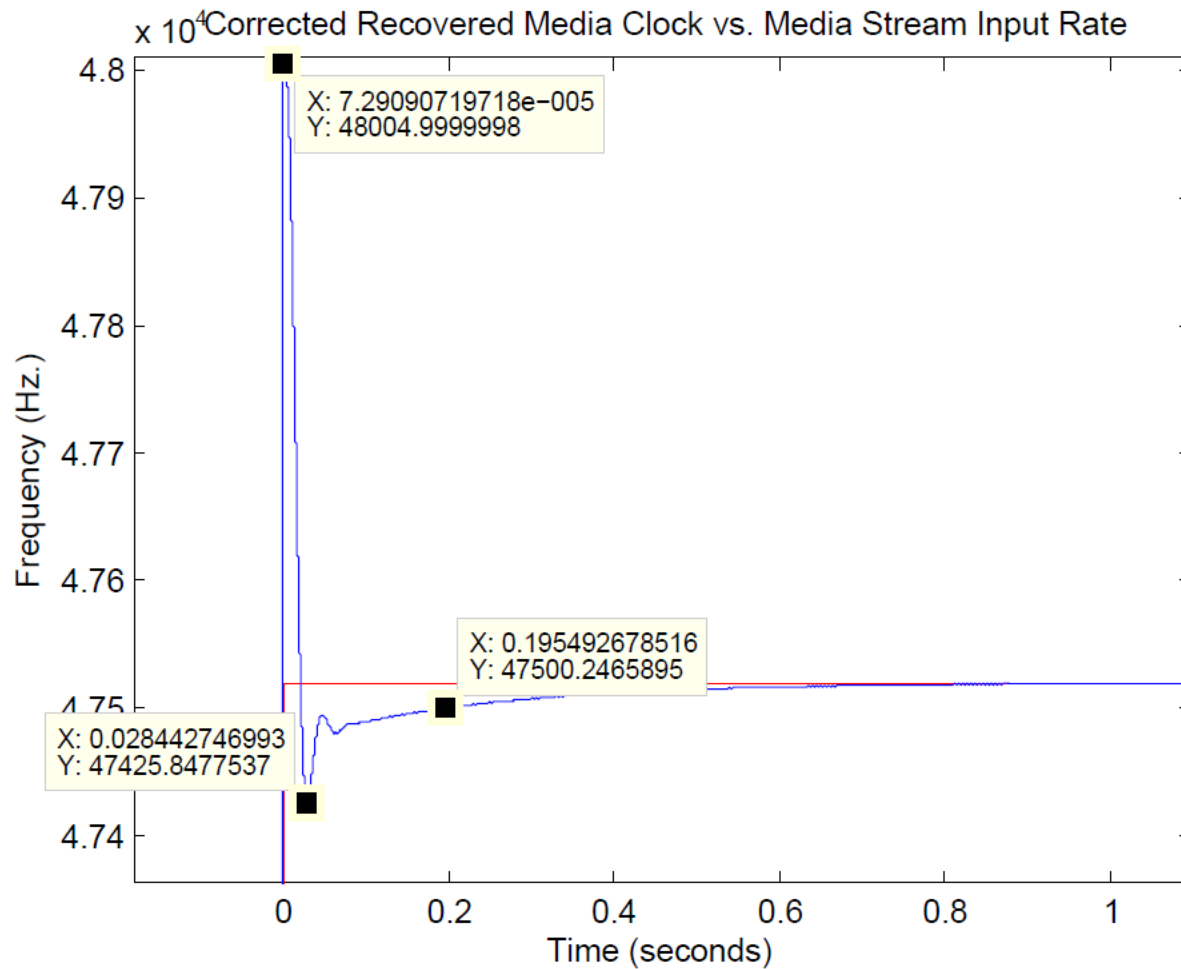


Initial Results

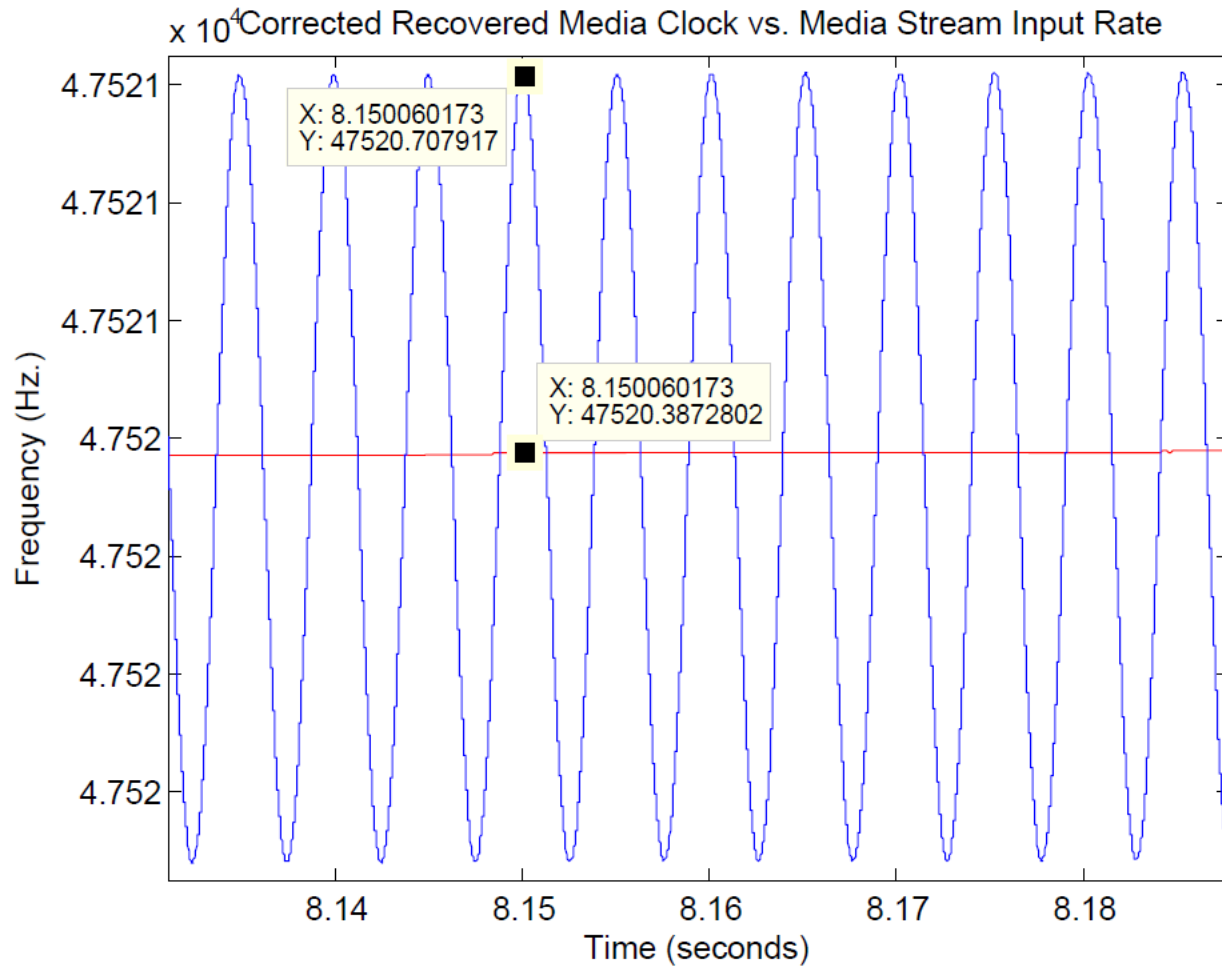
Results: Use Case 2



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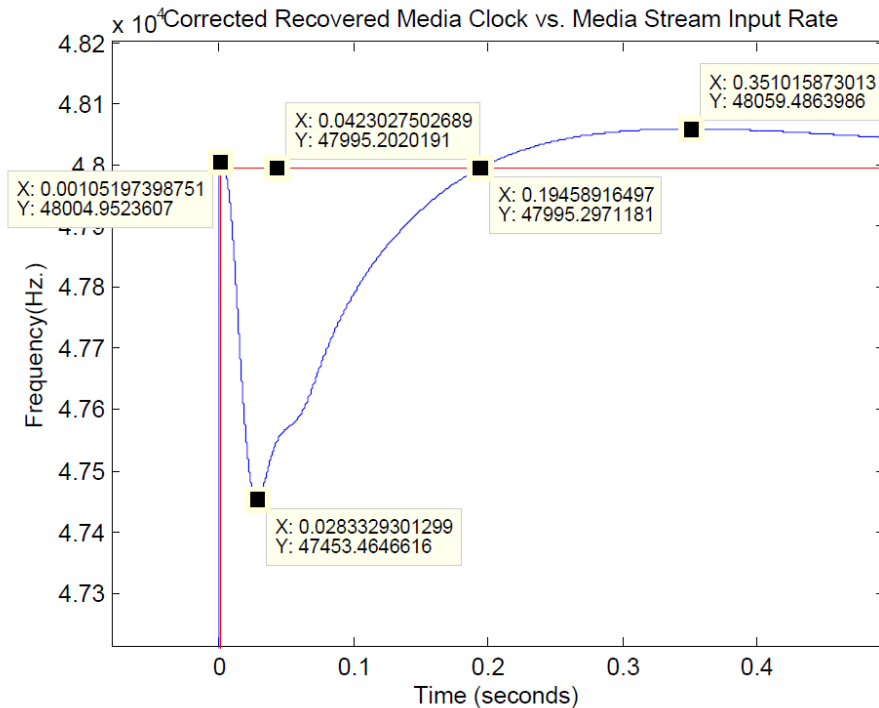


Results: Use Case 2

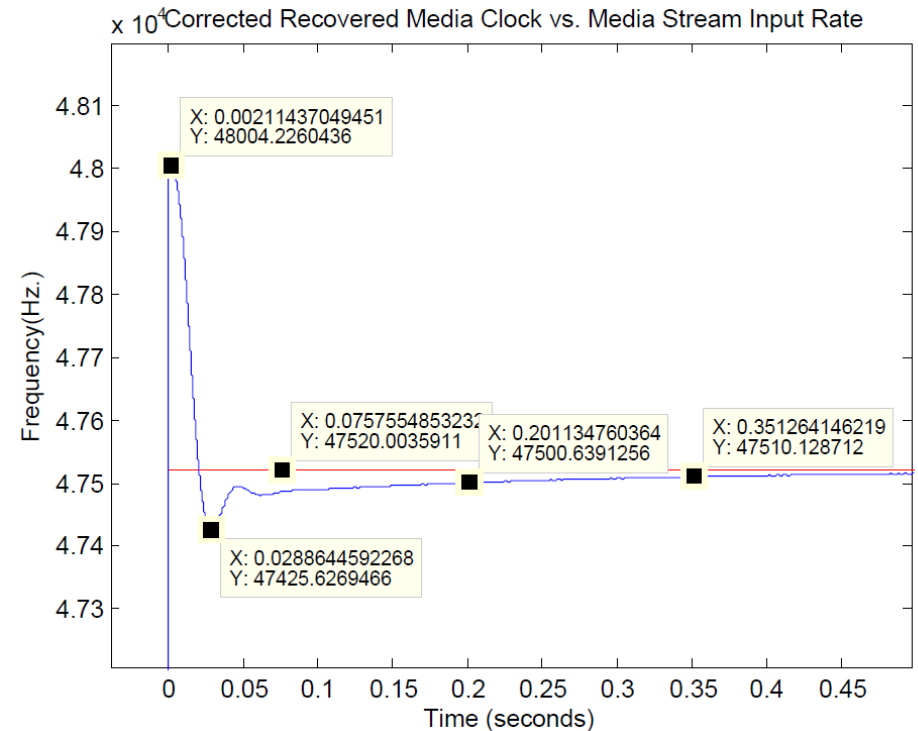


Comparison of recovered media clocks

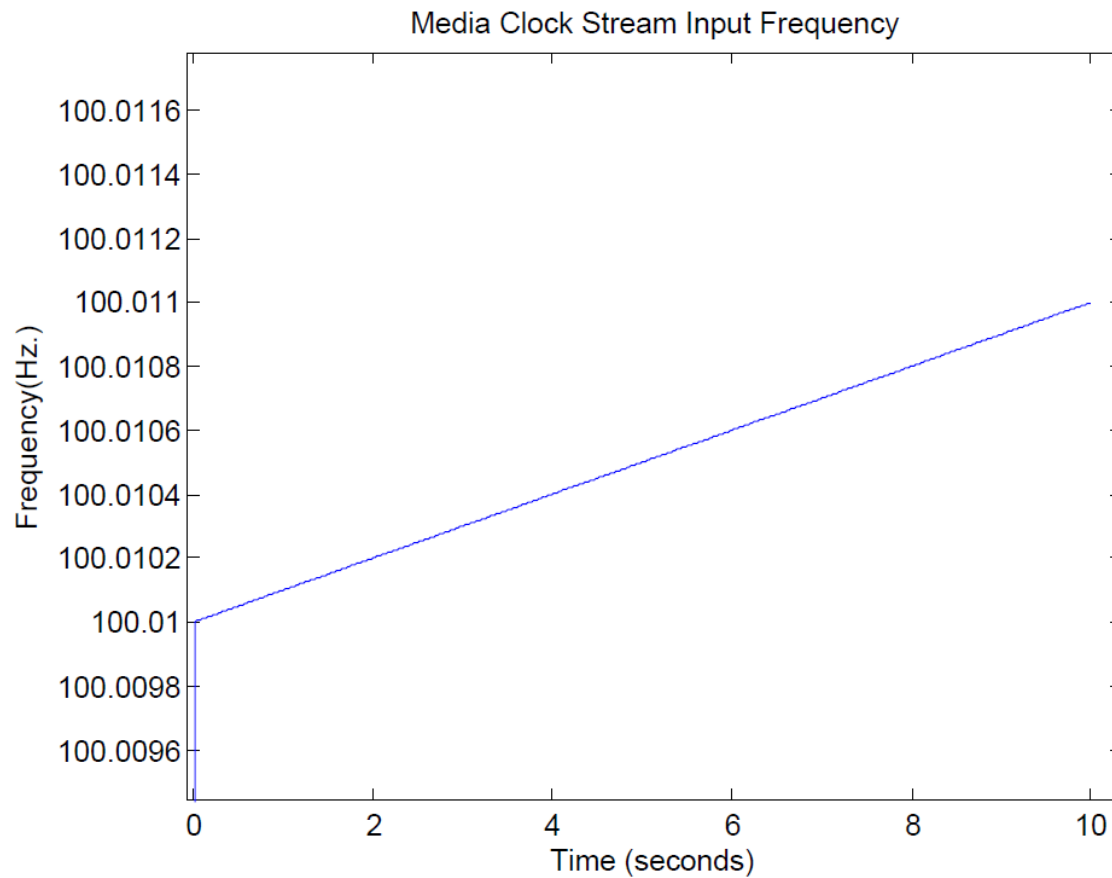
Use Case 1:



Use Case 2:

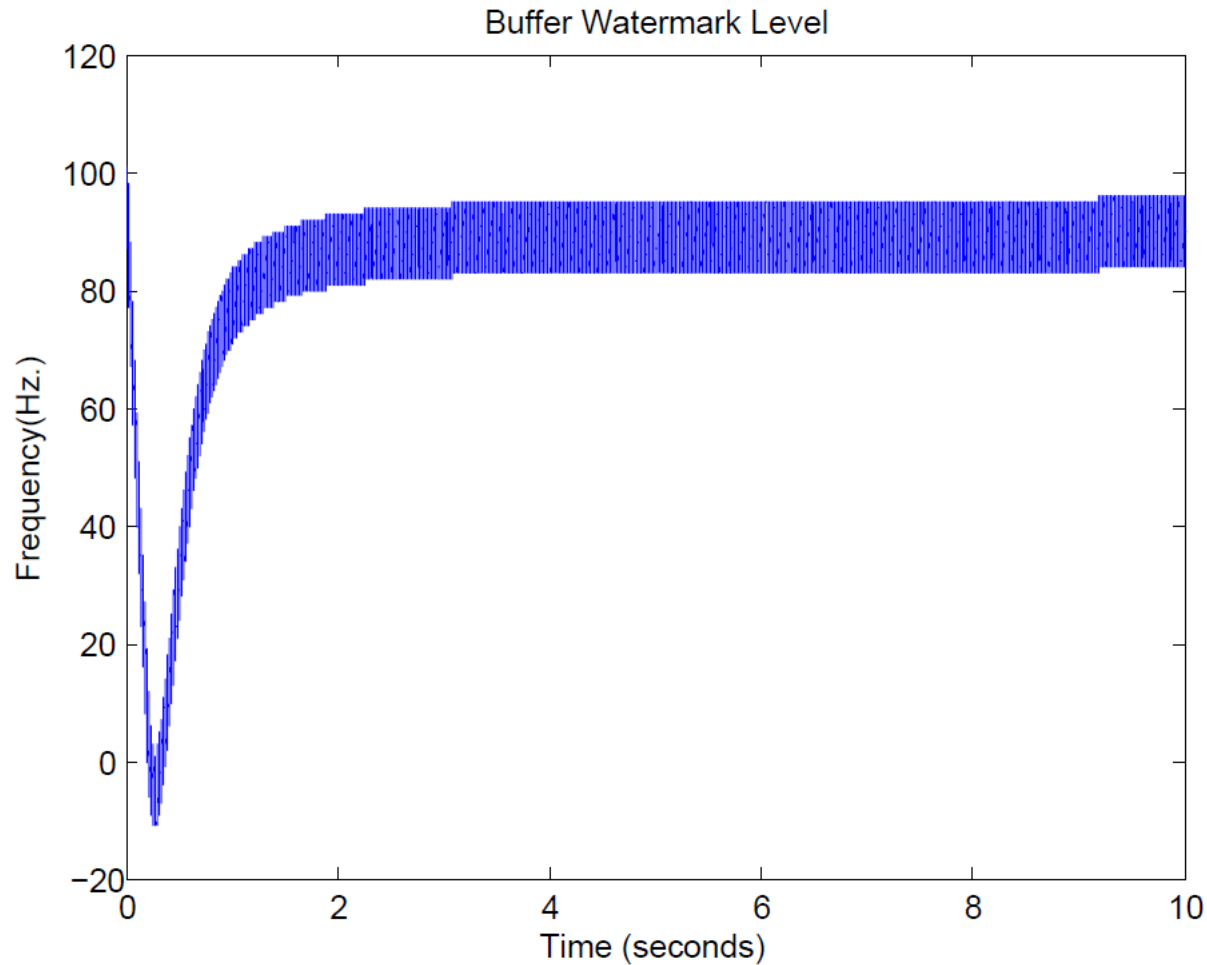


Then tried Use Case 1 with input frequency of MCS +200 PPM over Q-frequency of PLL (47995 Hz for PLL) with all other parameters being the same as previous two use cases.



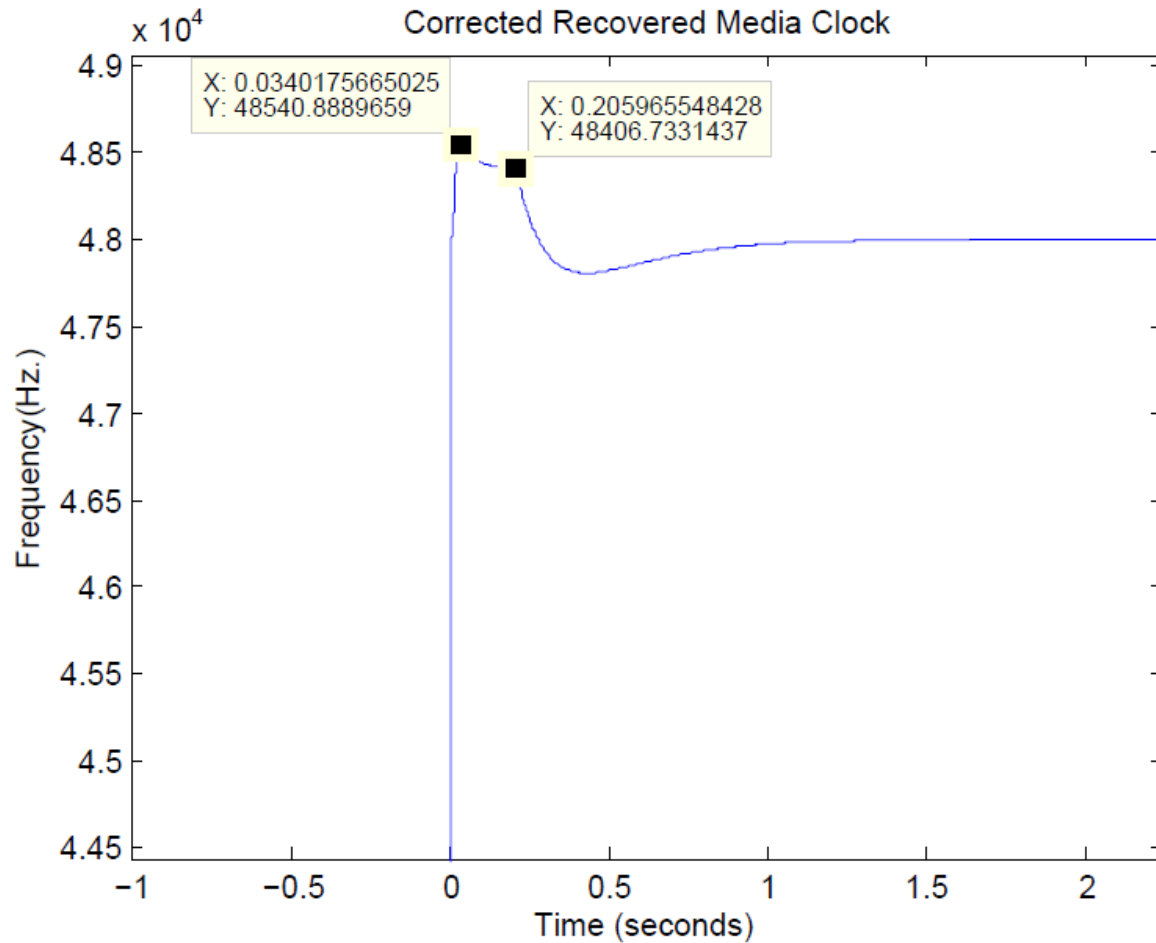
Initial Results

Watermark goes below zero



Initial Results

Recovered media clock reaches 48540 Hz.



Initial Results

PLL gives corresponding high frequencies (no correction provided at this stage)

