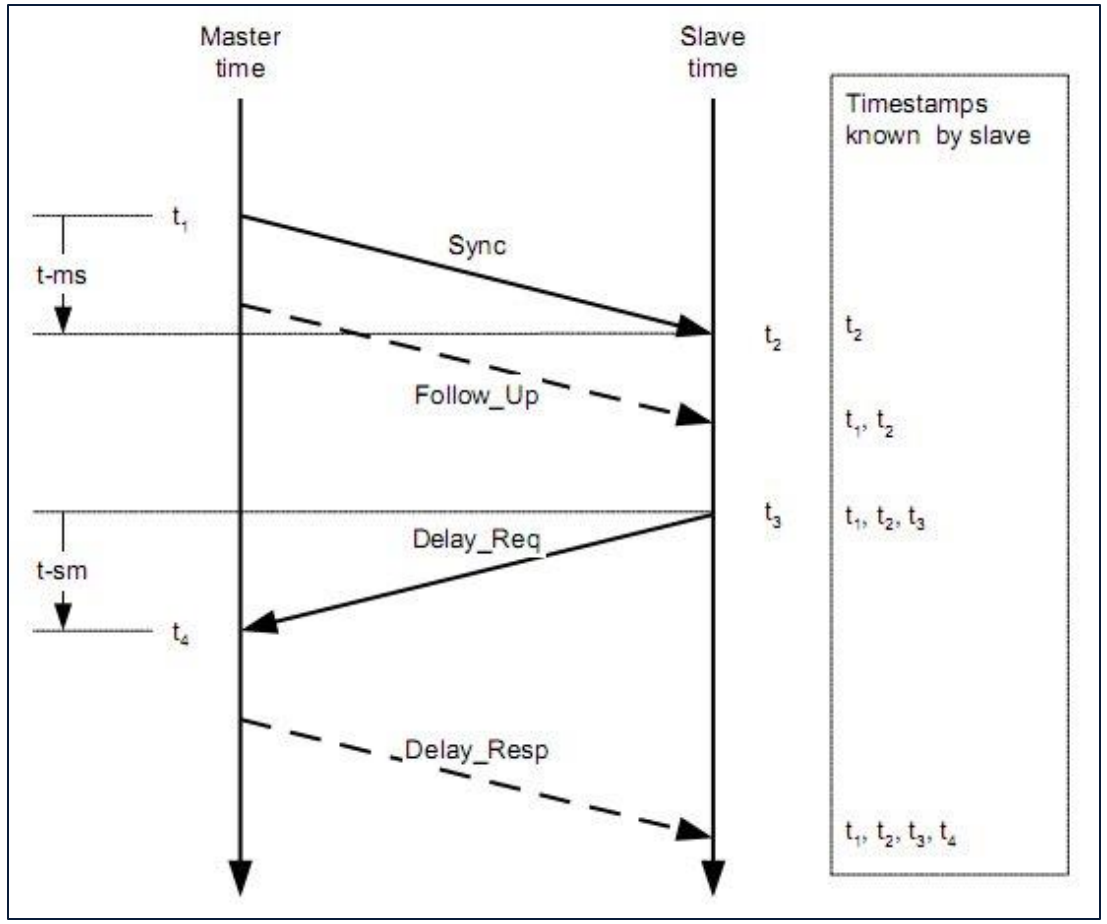
The bridge to possible

Introduce to PTP Bad timestamp Analyzer(PBA)

An idea from SR

Stone Li(guangli2@cisco.com)

IEEE 1588 PTP Clock Synchronization



- Offset from Master

  Offset = [(t2 – t1) - (t4 – t3)] / 2

- IF | Offset | >1500ns,It is a bad timestamp
- When a bad timestamp is occurring, **PTP Status should be changed in** show log
- Bad timestamp : calculated from PTP debug log
- PTP Status change : show log

Enable PTP Debug

Enable PTP Debug

- Enable logging

  starts the logging into ptp_trace_file.log

  ```
  debug ptp platform servo log 3
  ```

- Clear the logfile

  ```
  >/harddisk\/ptp_trace_file.log
  ```

```
RP/0/RP1/CPU0:NCS-5508-A#debug ptp platform servo log 3
Wed Jun 16 07:02:07.456 UTC
RP/0/RP1/CPU0:NCS-5508-A#run
[xr-vm_node0_RP1_CPU0:/harddisk:]$>ptp_trace_file.log
```

ptp_trace_file.log

```
Raw Input: Tx 00005EAB1214.03810690, Rx 00005EAB1214.0383250F
Raw Input: stream:0
Ts diff (with Corr sec): Tx 5EAB1214.03810690, Rx 5EAB1214.0383250F, CorrSec 00000000, stream:0
Raw Input: Tx 00005EAB1214.046E7238, Rx 00005EAB1214.047090B4
Raw Input: stream:1
Ts diff (with Corr sec): Tx 5EAB1214.046E7238, Rx 5EAB1214.047090B4, CorrSec 00000000, stream:1
[12292689.370806140, 0x7ff5dd998ba0:0] No. 2 a 90060 y = 0 821834896
Raw Input: Tx 00005EAB1214.0731BB9C, Rx 00005EAB1214.0733DA16
Raw Input: stream:0
Ts diff (with Corr sec): Tx 5EAB1214.0731BB9C, Rx 5EAB1214.0733DA16, CorrSec 00000000, stream:0
Raw Input: Tx 00005EAB1214.0840E3D8, Rx 00005EAB1214.08430254
Raw Input: stream:1
Ts diff (with Corr sec): Tx 5EAB1214.0840E3D8, Rx 5EAB1214.08430254, CorrSec 00000000, stream:1
[12292689.370842970, 0x7ff5dd998ba0:0] No. 2 a 90060 y = 0 821834899
Raw Input: Tx 00005EAB1214.0AC72F14, Rx 00005EAB1214.0AC94D96
Raw Input: stream:0
Ts diff (with Corr sec): Tx 5EAB1214.0AC72F14, Rx 5EAB1214.0AC94D96, CorrSec 00000000, stream:0
Raw Input: Tx 00005EAB1214.0BD438FC, Rx 00005EAB1214.0BD65778
Raw Input: stream:1
Ts diff (with Corr sec): Tx 5EAB1214.0BD438FC, Rx 5EAB1214.0BD65778, CorrSec 00000000, stream:1
[12292689.467516672, 0x7ff5dd998ba0:0] No. 2 a 90060 y = 0 821834895
Raw Input: Tx 00005EAB1214.0E972AFC, Rx 00005EAB1214.0E99497F
Raw Input: stream:0
Ts diff (with Corr sec): Tx 5EAB1214.0E972AFC, Rx 5EAB1214.0E99497F, CorrSec 00000000, stream:0
Raw Input: Tx 00005EAB1214.0F84DDC1, Rx 00005EAB1214.0F86FC3C
Raw Input: stream:1
Ts diff (with Corr sec): Tx 5EAB1214.0F84DDC1, Rx 5EAB1214.0F86FC3C, CorrSec 00000000, stream:1
```

One PTP Clock Synchronization

```
Raw Input: Tx 00005EAB1214.03810690, Rx 00005EAB1214.0383250F
Raw Input: stream:0
Ts diff (with Corr sec): Tx 5EAB1214.03810690, Rx 5EAB1214.0383250F, CorrSec 00000000, stream:0
Raw Input: Tx 00005EAB1214.046E7238, Rx 00005EAB1214.047090B4
Raw Input: stream:1
Ts diff (with Corr sec): Tx 5EAB1214.046E7238, Rx 5EAB1214.047090B4, CorrSec 00000000, stream:1
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Raw Input: stream:0
Ts diff (with Corr sec): Tx 5EAB1214.0AC72F14, Rx 5EAB1214.0AC94D96, CorrSec 00000000, stream:0
Raw Input: Tx 00005EAB1214.0BD438FC, Rx 00005EAB1214.0BD65778
Raw Input: stream:1
Ts diff (with Corr sec): Tx 5EAB1214.0BD438FC, Rx 5EAB1214.0BD65778, CorrSec 00000000, stream:1
[12292689.467516672, 0x7ff5dd998ba0:0] No. 2 a 90060 y = 0 821834895
Raw Input: Tx 00005EAB1214.0E972AFC, Rx 00005EAB1214.0E99497F
Raw Input: stream:0
Ts diff (with Corr sec): Tx 5EAB1214.0E972AFC, Rx 5EAB1214.0E99497F, CorrSec 00000000, stream:0
Raw Input: Tx 00005EAB1214.0F84DDC1, Rx 00005EAB1214.0F86FC3C
Raw Input: stream:1
Ts diff (with Corr sec): Tx 5EAB1214.0F84DDC1, Rx 5EAB1214.0F86FC3C, CorrSec 00000000, stream:1
```
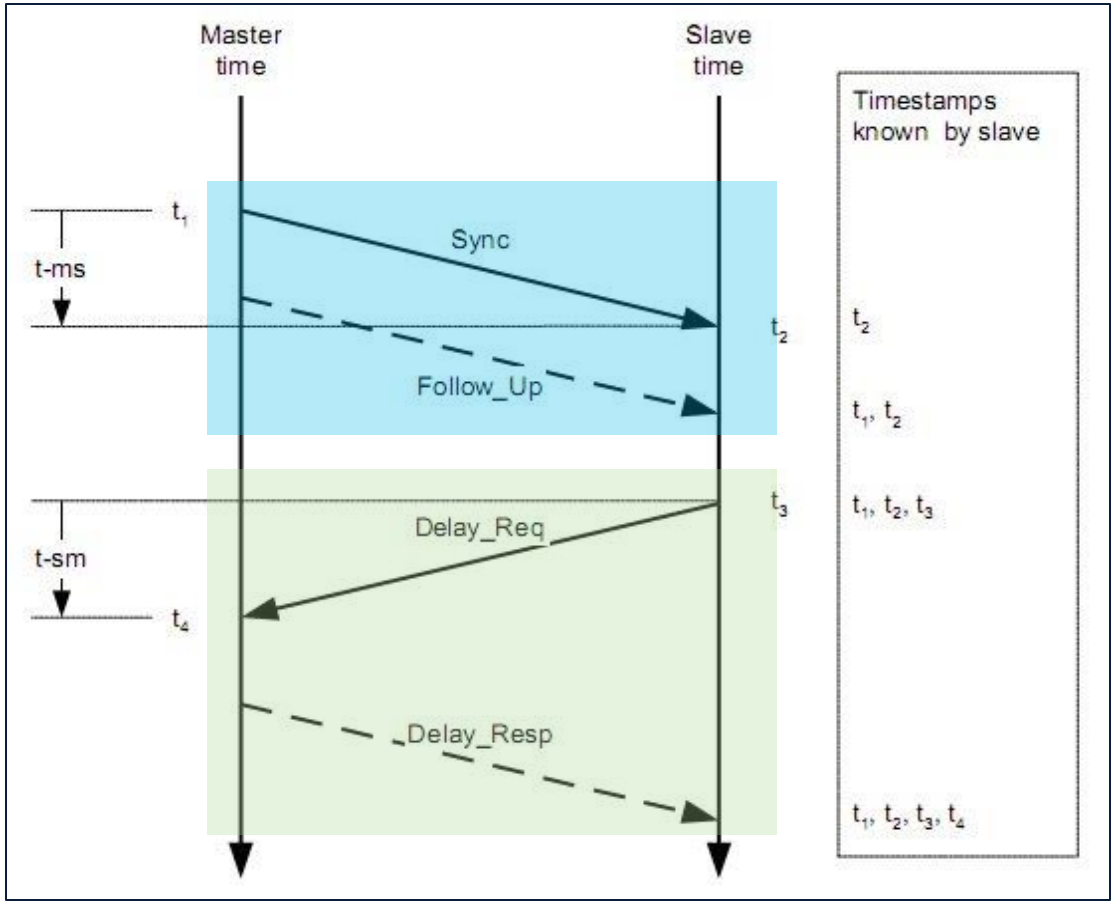
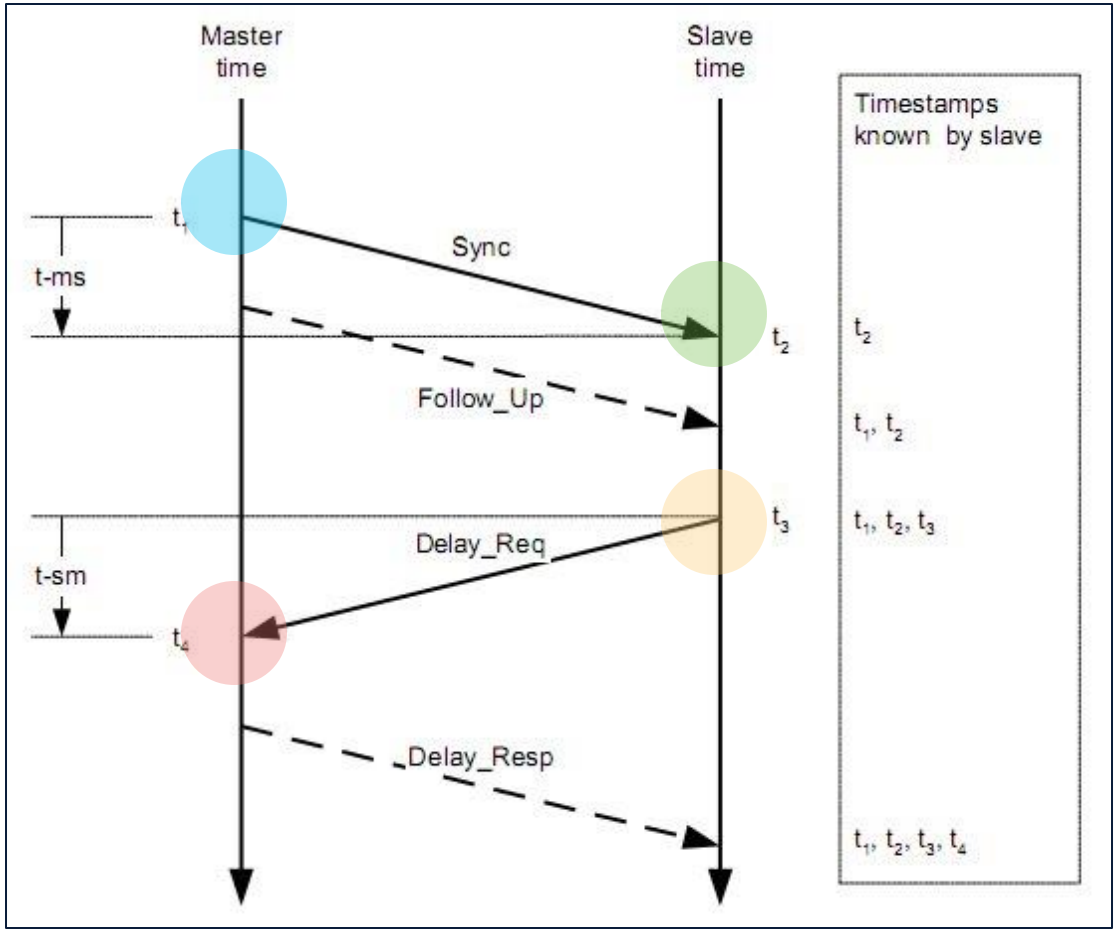



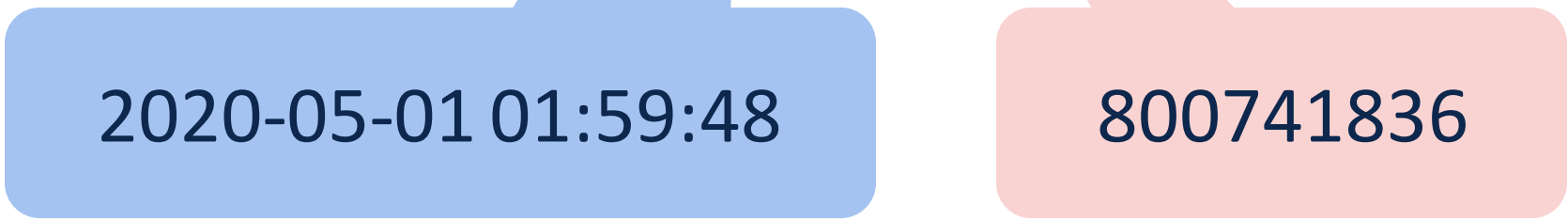
Timestamp(HEX) in PTP Debug file

```
Raw Input: Tx 00005EAB1214.2FBA59CC, Rx 00005EAB1214.2FBC7846
Raw Input: stream:0
Ts diff (with Corr sec): Tx 5EAB1214.2FBA59CC, Rx 5EAB1214.2FBC7846,
Raw Input: Tx 00005EAB1214.30C8B260, Rx 00005EAB1214.30CAD0E0
Raw Input: stream:1
Ts diff (with Corr sec): Tx 5EAB1214.30C8B260, Rx 5EAB1214.30CAD0E0,
[12292690.048054083, 0x7ff5dd998ba0:0] No. 2 a 90060 y = 0 821834899
Raw Input: Tx 00005EAB1214.3479282D, Rx 00005EAB1214.347B46B0
Raw Input: stream:1
Ts diff (with Corr sec): Tx 5EAB1214.3479282D, Rx 5EAB1214.347B46B0,
[12292690.144862097, 0x7ff5dd998ba0:0] No. 2 a 90060 y = 0 821834899
[12292690.172002379, 0x7ff5dd998ba0:65534] b 4100:    0    0    0
Raw Input: Tx 00005EAB1214.375C9EE0, Rx 00005EAB1214.375EBD62
Raw Input: stream:0
Ts diff (with Corr sec): Tx 5EAB1214.375C9EE0, Rx 5EAB1214.375EBD62,
Raw Input: Tx 00005EAB1214.380CD800, Rx 00005EAB1214.380EF680
Raw Input: stream:1
Ts diff (with Corr sec): Tx 5EAB1214.380CD800, Rx 5EAB1214.380EF680,
[12292690.241486374, 0x7ff5dd998ba0:0] No. 2 a 90060 y = 0 821834898
```



Timestamp Explanation

Raw Input: Tx 00005EAB1214.2FBA59CC, Rx 00005EAB1214.2FBC7846
Raw Input: stream:0
Ts diff (with Corr sec): Tx 5EAB1214.2FBA59CC, Rx 5EAB1214.2FBC7846, CorrSec 00000000, stream:0



Check PTP Status Log

show logging | in Servo

```
RP/0/RP0/CPU0:May 26 04:03:21.408 KST: ptp_ctrlr[1159]: %PLATFORM-PTP-6-SERVO_EVENTS : PTP Servo state transition from state PHASE_LOCKED to state FREQ_LOCKED
RP/0/RP0/CPU0:May 26 04:03:51.432 KST: ptp_ctrlr[1159]: %PLATFORM-PTP-6-SERVO_EVENTS : PTP Servo state transition from state FREQ_LOCKED to state PHASE_LOCKED
RP/0/RP0/CPU0:May 26 16:56:27.310 KST: ptp_ctrlr[1159]: %PLATFORM-PTP-6-SERVO_EVENTS : PTP Servo state transition from state PHASE_LOCKED to state FREQ_LOCKED
RP/0/RP0/CPU0:May 26 16:56:57.816 KST: ptp_ctrlr[1159]: %PLATFORM-PTP-6-SERVO_EVENTS : PTP Servo state transition from state FREQ_LOCKED to state PHASE_LOCKED
```

PTP Debug File

```
Raw Input: Tx 00005EAB1214.03810690, Rx 00005EAB1214.0383250F
Raw Input: stream:0
Ts diff (with Corr sec): Tx 5EAB1214.03810690, Rx 5EAB1214.0383250F, CorrSec 00000000, stream:0
Raw Input: Tx 00005EAB1214.046E7238, Rx 00005EAB1214.047090B4
Raw Input: stream:1
Ts diff (with Corr sec): Tx 5EAB1214.046E7238, Rx 5EAB1214.047090B4, CorrSec 00000000, stream:1
[12292689.370806140, 0x7ff5dd998ba0:0] No. 2 a 90060 y = 0 821834896
Raw Input: Tx 00005EAB1214.0731BB9C, Rx 00005EAB1214.0733DA16
Raw Input: stream:0
Ts diff (with Corr sec): Tx 5EAB1214.0731BB9C, Rx 5EAB1214.0733DA16, CorrSec 00000000, stream:0
Raw Input: Tx 00005EAB1214.0840E3D8, Rx 00005EAB1214.08430254
Raw Input: stream:1
Ts diff (with Corr sec): Tx 5EAB1214.0840E3D8, Rx 5EAB1214.08430254, CorrSec 00000000, stream:1
[12292689.370842970, 0x7ff5dd998ba0:0] No. 2 a 90060 y = 0 821834899
```

2 approaches to calculate a bad timestamp

- Method 1

  From show log to PTP Debug File(which is widely used)

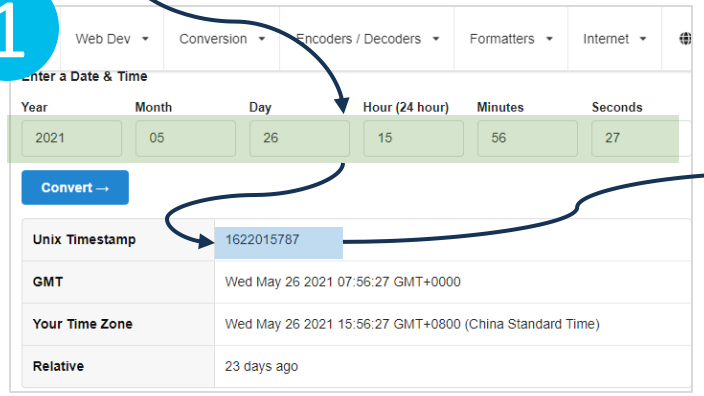
- Method 2

  From PTP Debug File to show log

Method 1 - Calculate Steps

```
RP/0/RP0/CPU0:May 26 16:56:27.310 KST: ptp_ctrlr[1159]: %PLATFORM-PTP-6-SERVO_EVENTS : PTP Servo state transition from state PHASE_LOCKED to state FREQ_LOCKED
RP/0/RP0/CPU0:May 26 16:56:57.816 KST: ptp_ctrlr[1159]: %PLATFORM-PTP-6-SERVO_EVENTS : PTP Servo state transition from state FREQ_LOCKED to state PHASE_LOCKED
```

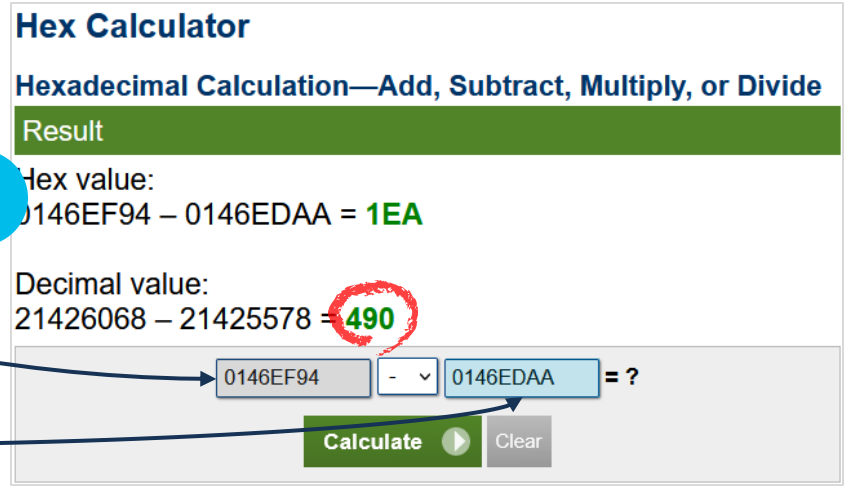
1



2


```
Raw Input: Tx 000060ADFF2B.0146EDAA, Rx 000060ADFF2B.0146EF94
Ts diff (with Corr sec): Tx 60ADFF2B.0146EDAA, Rx 60ADFF2B.0146EF94, CorrSec 00000000, stream:1
Raw Input: Tx 000060ADFF2B.016D3710, Rx 000060ADFF2B.016D3904
Ts diff (with Corr sec): Tx 60ADFF2B.016D3710, Rx 60ADFF2B.016D3904, CorrSec 00000000, stream:0
Raw Input: Tx 000060ADFF2B.04F8F5A0, Rx 000060ADFF2B.04F8F794
Ts diff (with Corr sec): Tx 60ADFF2B.04F8F5A0, Rx 60ADFF2B.04F8F794, CorrSec 00000000, stream:1
Raw Input: Tx 000060ADFF2B.0526E3B0, Rx 000060ADFF2B.0526E59B
Ts diff (with Corr sec): Tx 60ADFF2B.0526E3B0, Rx 60ADFF2B.0526E59B, CorrSec 00000000, stream:0
Raw Input: Tx 000060ADFF2B.08AAB164, Rx 000060ADFF2B.08AAB354
Ts diff (with Corr sec): Tx 60ADFF2B.08AAB164, Rx 60ADFF2B.08AAB354, CorrSec 00000000, stream:1
Raw Input: Tx 000060ADFF2B.08E09050, Rx 000060ADFF2B.08E09237
Ts diff (with Corr sec): Tx 60ADFF2B.08E09050, Rx 60ADFF2B.08E09237, CorrSec 00000000, stream:0
Raw Input: Tx 000060ADFF2B.0C5D0B60, Rx 000060ADFF2B.0C5D0D54
Ts diff (with Corr sec): Tx 60ADFF2B.0C5D0B60, Rx 60ADFF2B.0C5D0D54, CorrSec 00000000, stream:1
Raw Input: Tx 000060ADFF2B.0C9A3CF0, Rx 000060ADFF2B.0C9A3ED7
Ts diff (with Corr sec): Tx 60ADFF2B.0C9A3CF0, Rx 60ADFF2B.0C9A3ED7, CorrSec 00000000, stream:0
```

3



Evaluate Workload

Need to Hex convert 16 x 2 = 32 times and 1 time offset calculation 1 second

	A	B	C	D	E	F	G	H	I
1	Debug_Time	T1	T2	T3	T4	T2-T	T4-T	Offset	BTSYI
11	2021-05-26 15:10:43	310360D2	310361E5	3295D2D4	3295D3F2	275	286	-5.5	
12	2021-05-26 15:10:43	34B70926	34B70A2C	3647F83C	3647F956	262	282	-10	
13	2021-05-26 15:10:43	38685BF6	38685D04	39F9974C	39F99862	270	278	-4	
14	2021-05-26 15:10:44	007F19F2	007F1AFC	0210D544	0210D65E	266	282	-8	
15	2021-05-26 15:10:44	0430D846	0430D950	05C31A88	05C31BA2	266	282	-8	
16	2021-05-26 15:10:44	07E281F6	07E28304	097474F0	09747606	270	278	-4	
17	2021-05-26 15:10:44	0B94935A	0B94946C	0D27E26C	0D27E386	274	282	-4	
18	2021-05-26 15:10:44	0F46A6CA	0F46A7DE	10D90525	10D90636	276	273	1.5	
19	2021-05-26 15:10:44	12F99A62	12F99B7A	148B30D2	148B31DE	280	268	6	
20	2021-05-26 15:10:44	16AA7DFA	16AA7F16	183DA31A	183DA42A	284	272	6	
21	2021-05-26 15:10:44	1A5C87FE	1A5C890C	1BEF5A88	1BEF5BA2	270	282	-6	
22	2021-05-26 15:10:44	1E0E9D3A	1E0E9E48	1FA124A0	1FA125BE	270	286	-8	
23	2021-05-26 15:10:44	21C0BF8A	21C0C094	23534704	23534822	266	286	-10	
24	2021-05-26 15:10:44	257298BE	257299C8	2705A3FC	2705A512	266	278	-6	
25	2021-05-26 15:10:44	2926A976	2926AA8E	2AB6DFB2	2AB6E0C2	280	272	4	
26	2021-05-26 15:10:44	2CD72CBE	2CD72DD2	2E68C74E	2E68C85E	276	272	2	
27	2021-05-26 15:10:44	3088EF7A	3088F092	321B64B2	321B65C6	280	276	2	
28	2021-05-26 15:10:44	343BB592	343BB6AE	35CCE02E	35CCE13A	284	268	8	
29	2021-05-26 15:10:44	37EDD252	37EDD366	397F9C26	397F9D36	276	272	2	
30	2021-05-26 15:10:45	0004629A	000463B2	0198AEF2	0198B002	280	272	4	

Method 2 - From PTP Debug File to Log

```
Raw Input: Tx 000060ADFF2B.0146EDAA, Rx 000060ADFF2B.0146EF94
Ts diff (with Corr sec): Tx 60ADFF2B.0146EDAA, Rx 60ADFF2B.0146EF94, CorrSec 00000000, stream:1
Raw Input: Tx 000060ADFF2B.016D3710, Rx 000060ADFF2B.016D3904
Ts diff (with Corr sec): Tx 60ADFF2B.016D3710, Rx 60ADFF2B.016D3904, CorrSec 00000000, stream:0
Raw Input: Tx 000060ADFF2B.04F8F5A0, Rx 000060ADFF2B.04F8F794
Ts diff (with Corr sec): Tx 60ADFF2B.04F8F5A0, Rx 60ADFF2B.04F8F794, CorrSec 00000000, stream:1
Raw Input: Tx 000060ADFF2B.0526E3B0, Rx 000060ADFF2B.0526E59B
Ts diff (with Corr sec): Tx 60ADFF2B.0526E3B0, Rx 60ADFF2B.0526E59B, CorrSec 00000000, stream:0
Raw Input: Tx 000060ADFF2B.08AAB164, Rx 000060ADFF2B.08AAB354
Ts diff (with Corr sec): Tx 60ADFF2B.08AAB164, Rx 60ADFF2B.08AAB354, CorrSec 00000000, stream:1
```

1

Hex Calculator

Hexadecimal Calculation—Add, Subtract, Multiply, or Divide

Result

Hex value:
0146EF94 – 0146EDAA = **1EA**

Decimal value:
21426068 – 21425578 = **490**

0146EF94 - 0146EDAA = ?

Calculate Clear

2

```
RP/0/RP0/CPU0:May 26 16:56:27.310 KST: ptp_ctrlr[1159]: %PLATFORM-PTP-6-SERVO_EVENTS : PTP Servo state transition from state PHASE_LOCKED to state FREQ_LOCKED
RP/0/RP0/CPU0:May 26 16:56:57.816 KST: ptp_ctrlr[1159]: %PLATFORM-PTP-6-SERVO_EVENTS : PTP Servo state transition from state FREQ_LOCKED to state PHASE_LOCKED
```

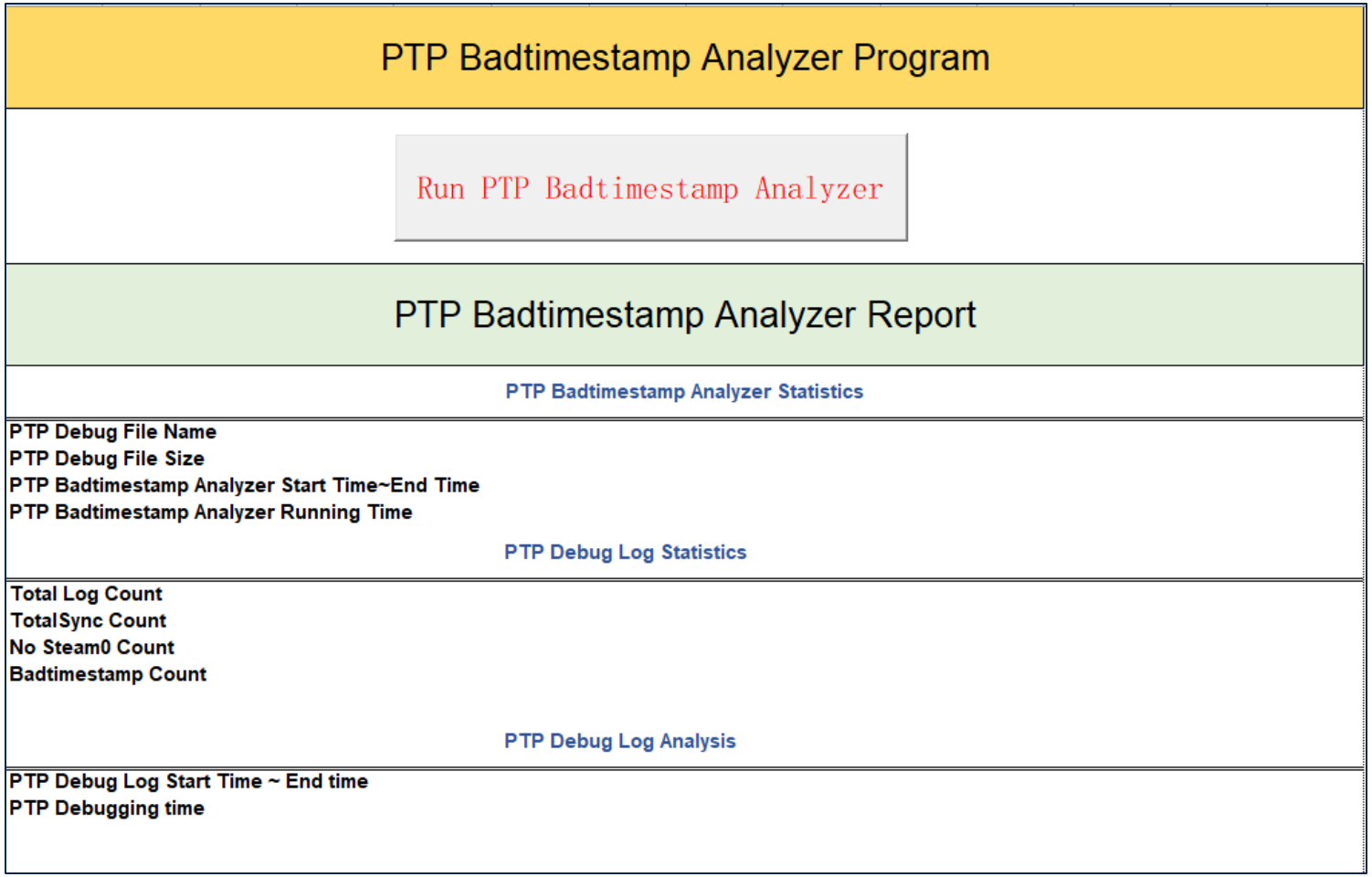
2 approaches to calculate a bad timestamp

	Method 1	Method 2
Approach	From show log to PTP Debug File	From PTP Debug File to show log
Advantage	Light calculate Workload	Can find all bad timestamp
Disadvantage	May be not find all bad timestamp	Heavy calculate workload
Assumption	PTP Timestamp matches with log	N/A

A perfect solution for calculating a PTP Debug file

- All People can use the solution.
- Easy to use.
- Calculate all offset timestamp for PTP Debug file
- Show bad timestamps.
- Report for the result of PTP Debug
- The performance of solution should acceptable

Solution for calculating a PTP Debug file



Check Bad timestamp count in data file

PTP Badtimestamp Analyzer Program

Run PTP Badtimestamp Analyzer

PTP Badtimestamp Analyzer Report

PTP Badtimestamp Analyzer Statistics

PTP Debug File Name	D:\005.Download\ptp_trace_file_IVR-C01.log
PTP Debug File Size	419.69 MB
PTP Badtimestamp Analyzer Start Time~End Time	2021-06-18 13:20:29~2021-06-18 13:38:35
PTP Badtimestamp Analyzer Running Time	0:18:06

PTP Debug Log Statistics

Total Log Count	1,122,920
TotalSync Count	1,121,628
No Steam0 Count	1,292
Badtimestamp Count	1

PTP Debug Log Analysis

PTP Debug Log Start Time ~ End time	2021-05-26 15:10:43~2021-05-27 10:31:12
PTP Debugging time	19:20:29

Please feel free to contact me if you need help.

Maintained by guangli2@cisco.com

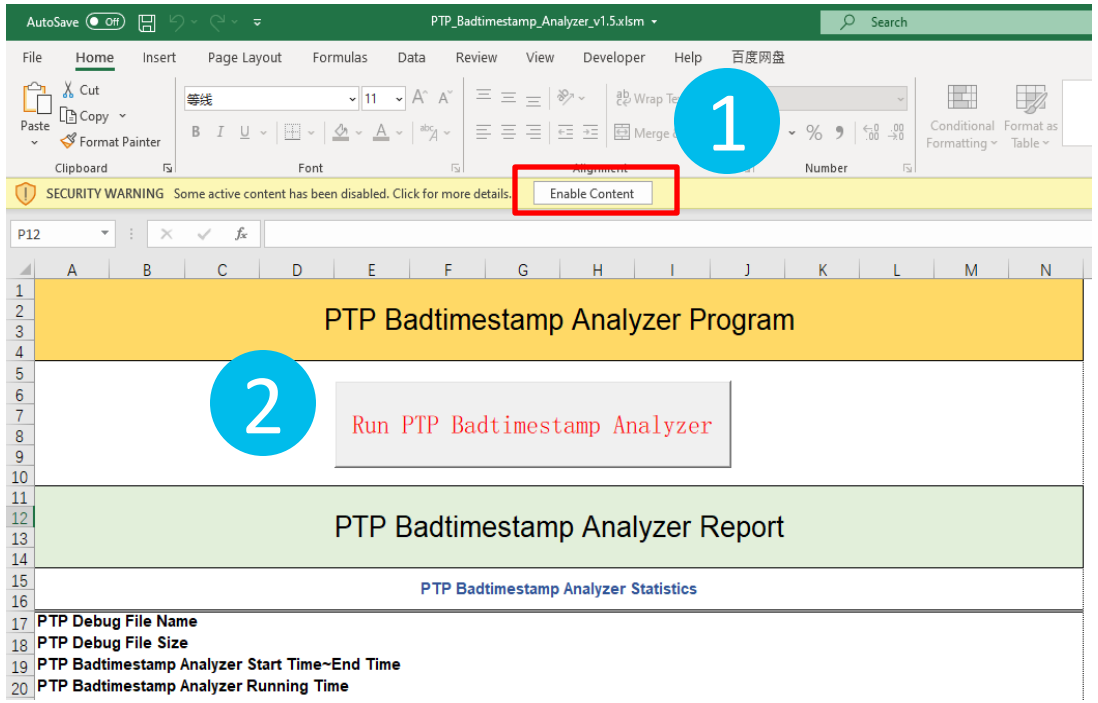
Main | PTP_TS_2 | PTP_TS_1

	Debug_Time	T1	T2	T3	T4	T2-T	T4-T	Offset	BTSYI
102427	2021-05-26 16:56:34	016D5CD8	016D38F7	01A0E364	01A0E554	-9185	496	-4840.5	Y

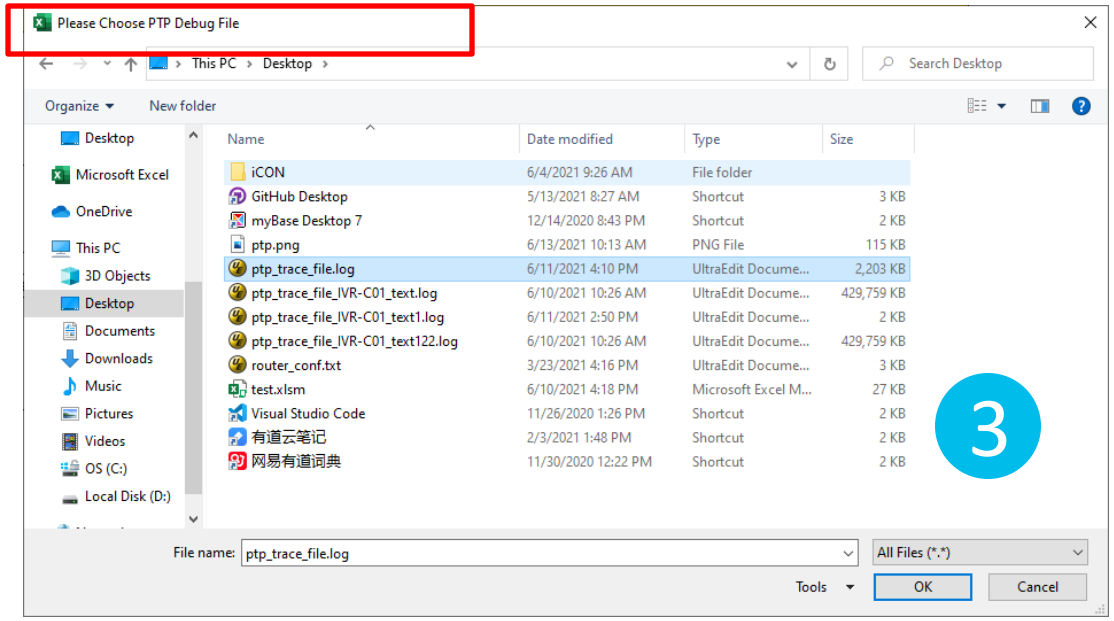
PTP Bad timestamp Analyzer(PBA)

How to run a PBA

Enable active content

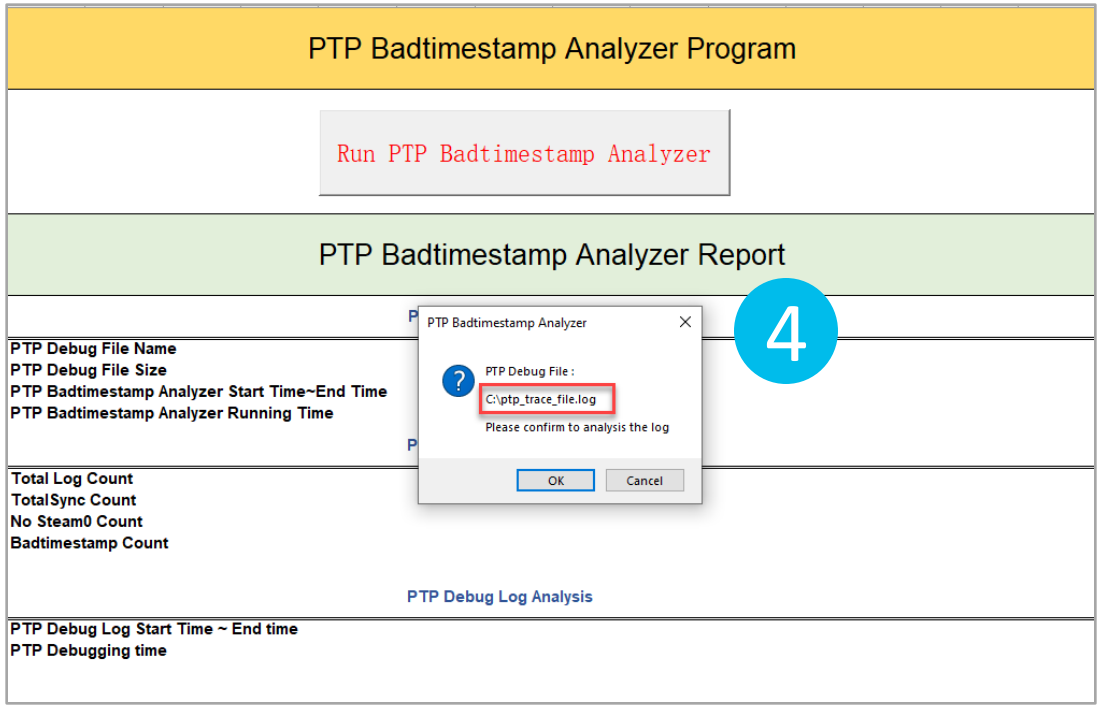


Choose PTP Debug file

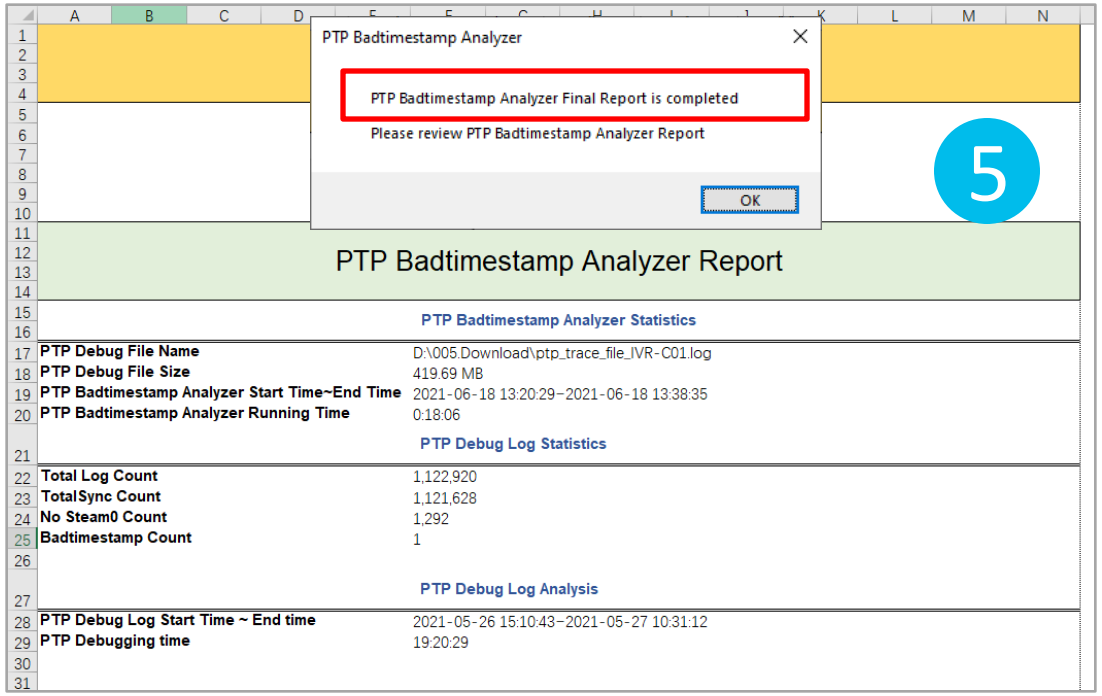


How to run a PBA

Review PTP_Debug file



Review PBA Report



Check Bad timestamps in data file

PTP Badtimestamp Analyzer Program

Run PTP Badtimestamp Analyzer

6

PTP Badtimestamp Analyzer Report

PTP Badtimestamp Analyzer Statistics

PTP Debug File Name	D:\005.Download\ptp_trace_file_IVR-C01.log
PTP Debug File Size	419.69 MB
PTP Badtimestamp Analyzer Start Time~End Time	2021-06-18 13:20:29~2021-06-18 13:38:35
PTP Badtimestamp Analyzer Running Time	0:18:06

PTP Debug Log Statistics

Total Log Count	1,122,920
TotalSync Count	1,121,628
No Steam0 Count	1,292
Badtimestamp Count	1

PTP Debug Log Analysis

PTP Debug Log Start Time ~ End time	2021-05-26 15:10:43~2021-05-27 10:31:12
PTP Debugging time	19:20:29

Please feel free to contact me if you need help.

Maintained by guangli2@cisco.com

Main | PTP_TS_2 | PTP_TS_1

	Debug_Time	T1	T2	T3	T4	T2-T	T4-T	Offset	BTSYI
102427	2021-05-26 16:56:34	016D5CD8	016D38F7	01A0E364	01A0E554	-9185	496	-4840.5	Y
1000002									
1000003									
1000004									
1000005									
1000006									
1000007									
1000008									
1000009									
1000010									
1000011									
1000012									
1000013									
1000014									
1000015									
1000016									
1000017									
1000018									
1000019									
1000020									
1000021									
1000022									

Performance

PBA processes big file size faster than small file size/sec

File Info	Test case 1	Test case 2	Test case 3
File Name	ptp_trace_file_IVR-C01.log	ptp_trace_file_180.log	ptp_trace_file.log
File Size	420MB	179 MB	2MB
Log Count	1,121,628	405,488	4,905
Using Time(sec)	952s(16min)	412s(7min)	6s
Process Sync/second	1178	984	817

Limitation

Limitation

- The Biggest file Size for test is 595MB in test.

  There is no test for file size over 595MB.

- Put PTP Debug File in English Name Folder.

  No Korean and Chinese Name Folder

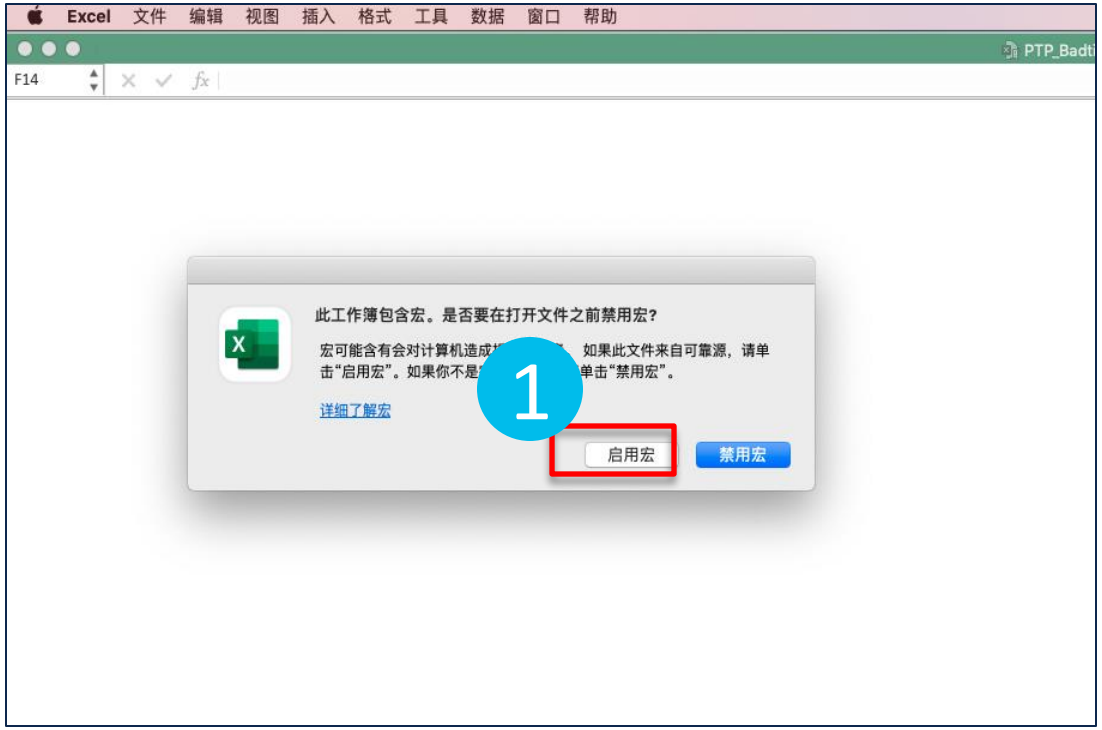
- Close the PTP Debug File which will be processed.
- Don’t run the other excel files, when the PBA runs.
- When PBA processes big size file, it would be stuck.

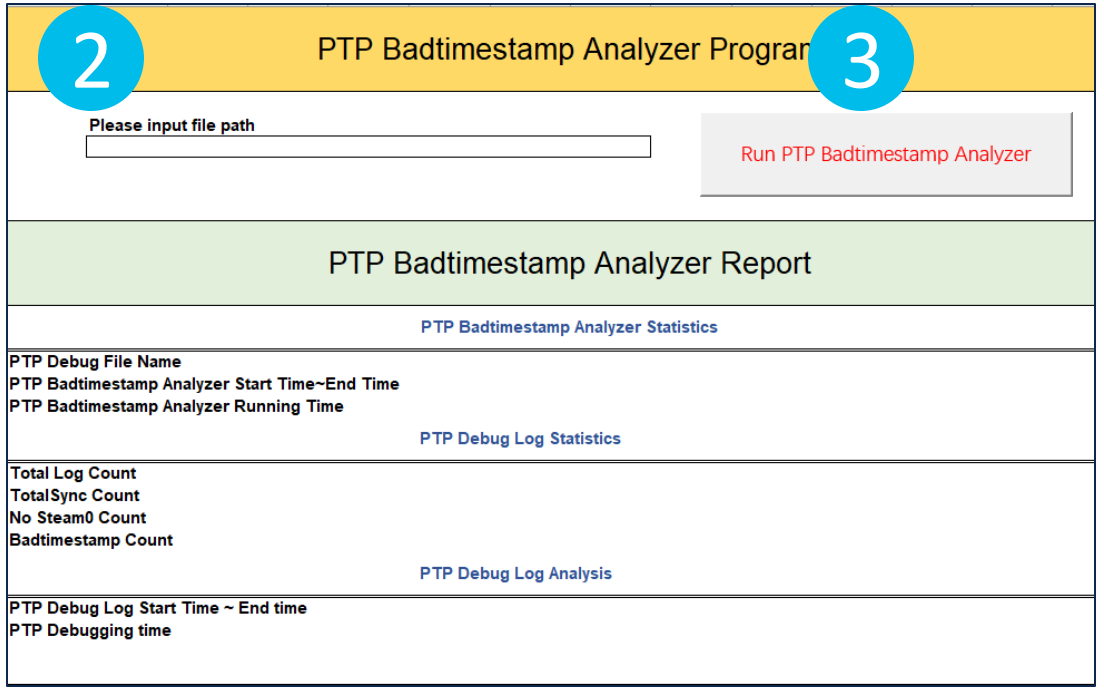
  Drink a coffee and take a rest until PBA completion.

PBA Mac Version Released!!!

How to run PBA Mac Version

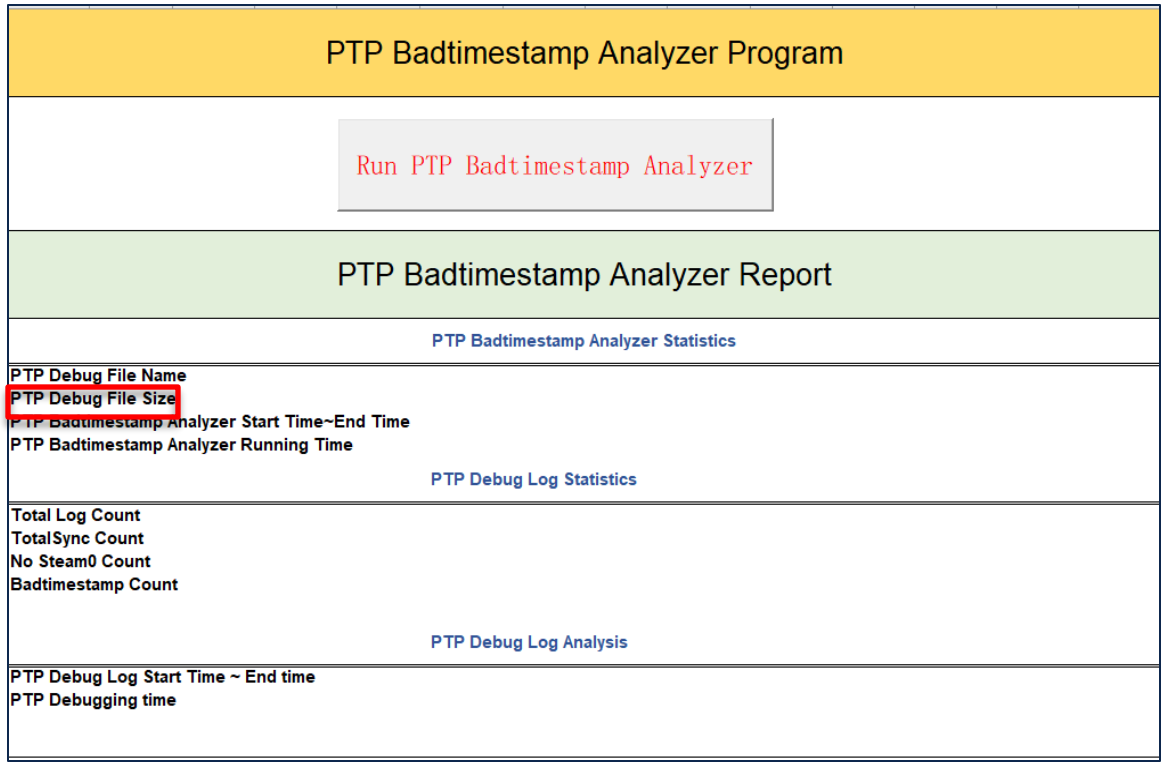
Similar operation like Microsoft Version

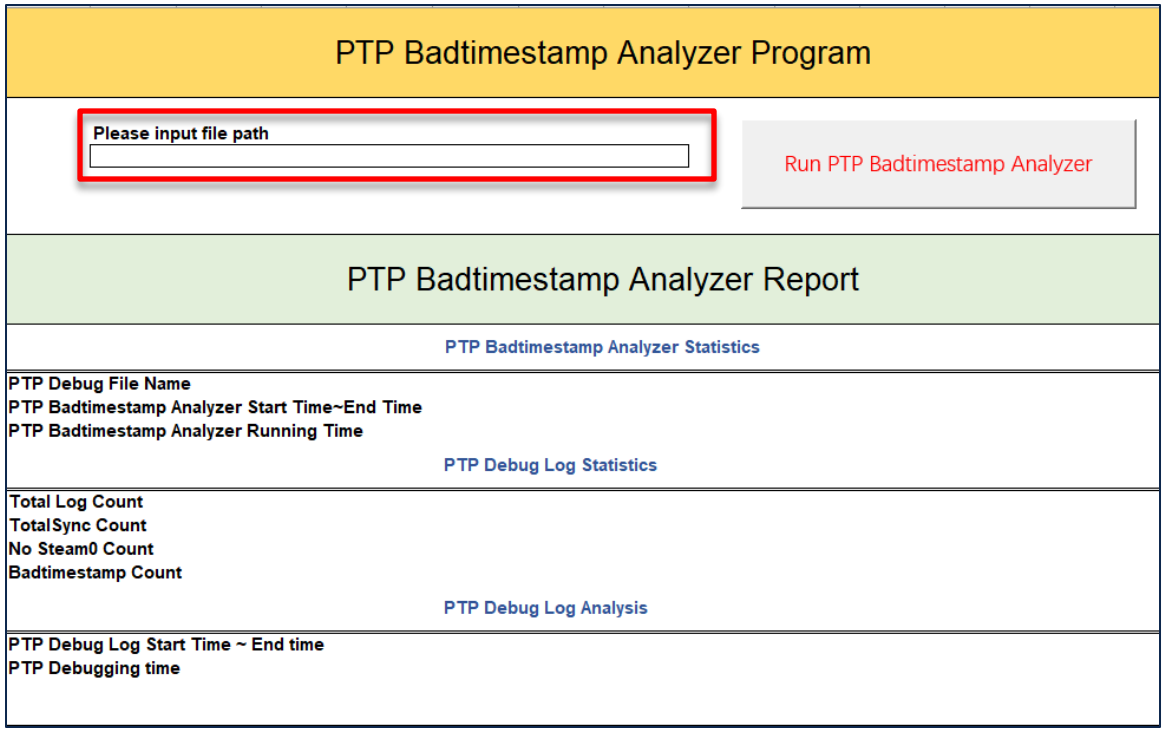




Microsoft VS Mac

- No PTP Debug File size
- Input file path

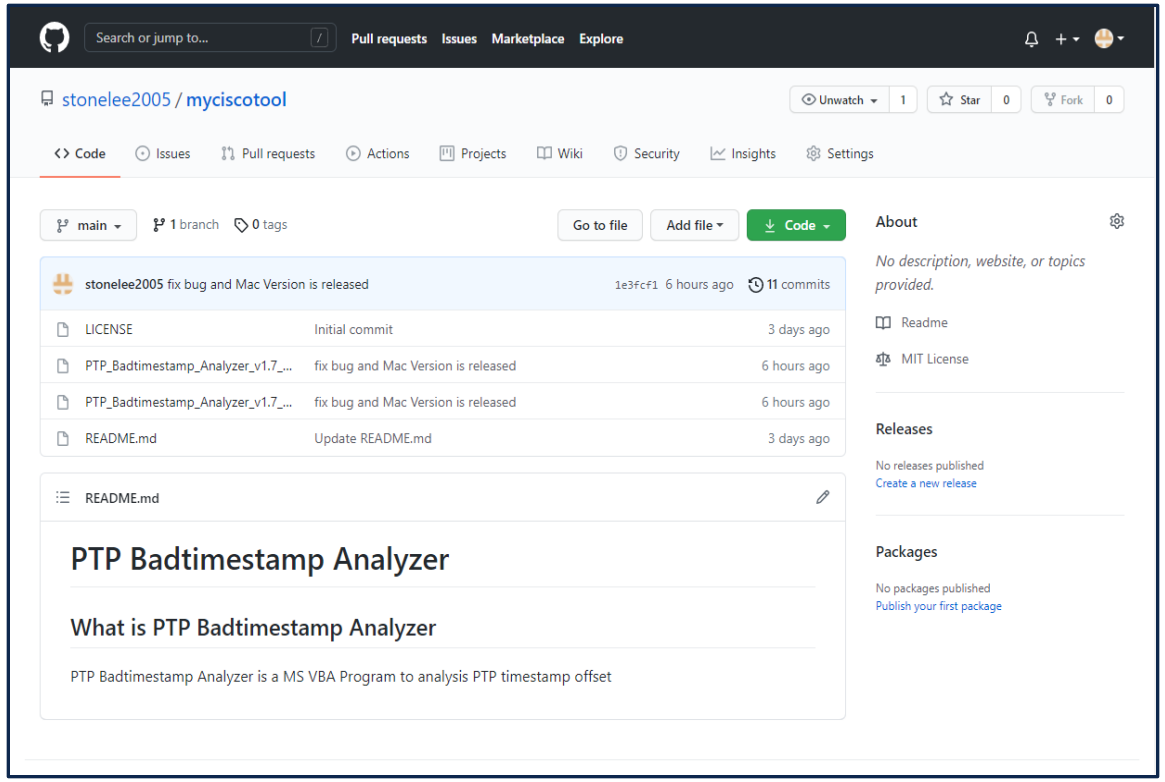


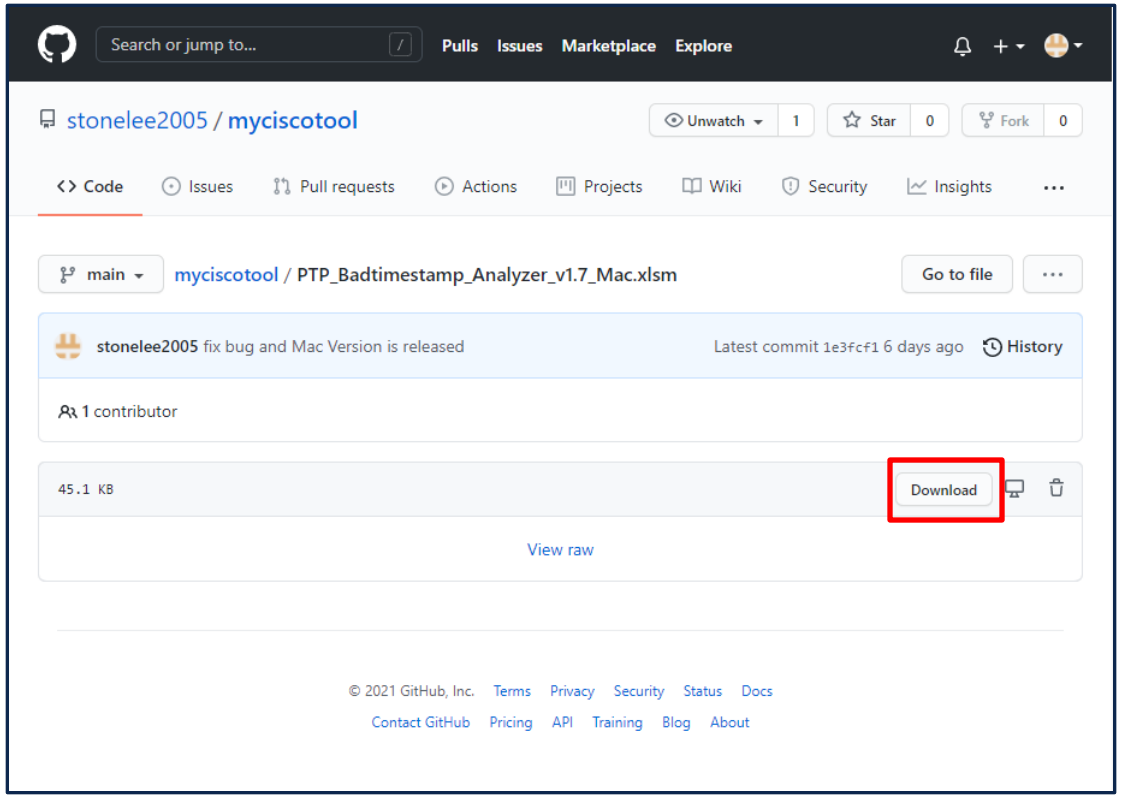


How to get a PBA

Get PBA from Github

- Get PBA from https://github.com/stonelee2005/myciscotool



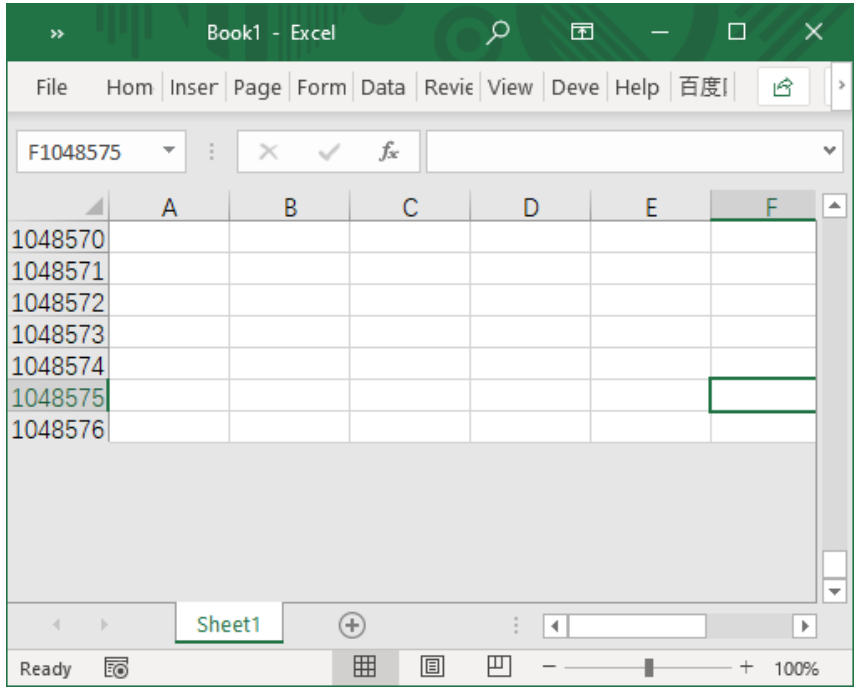


Q & A

Question 1

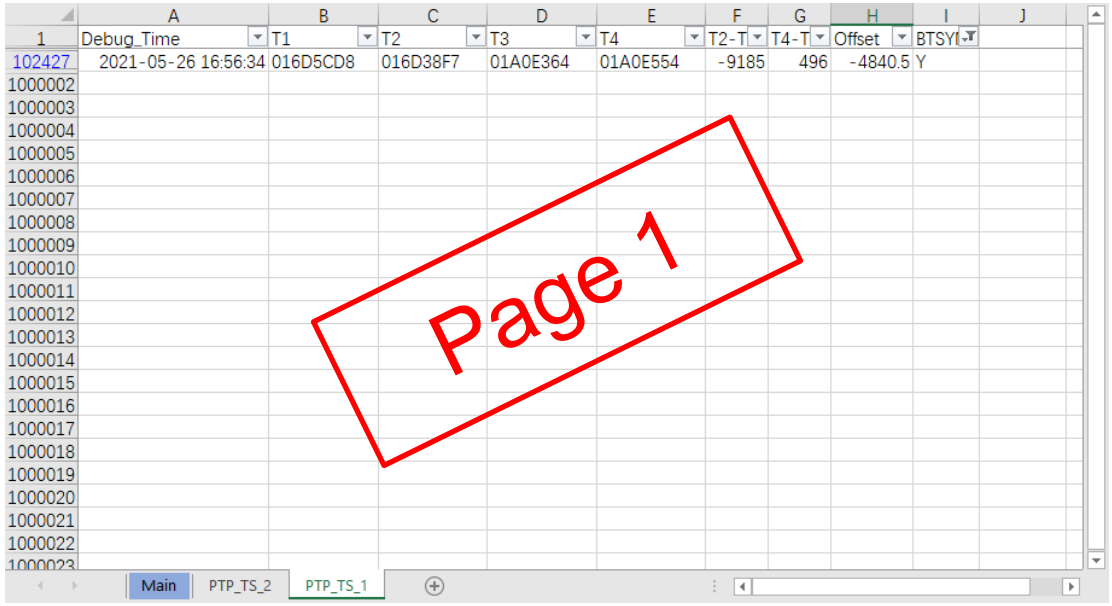
1,048,576 row limitation per 1 sheet in MS Excel.

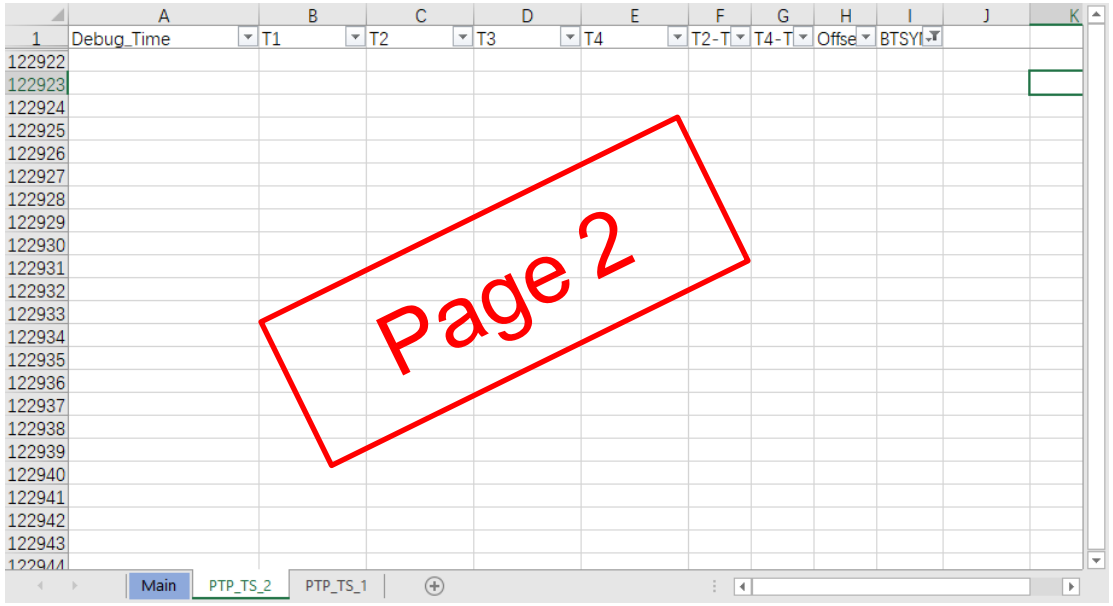
If PBA data can process row over 1,048,576 ?



Answer 1

PBA will create a new sheet if row over 1,000,000.



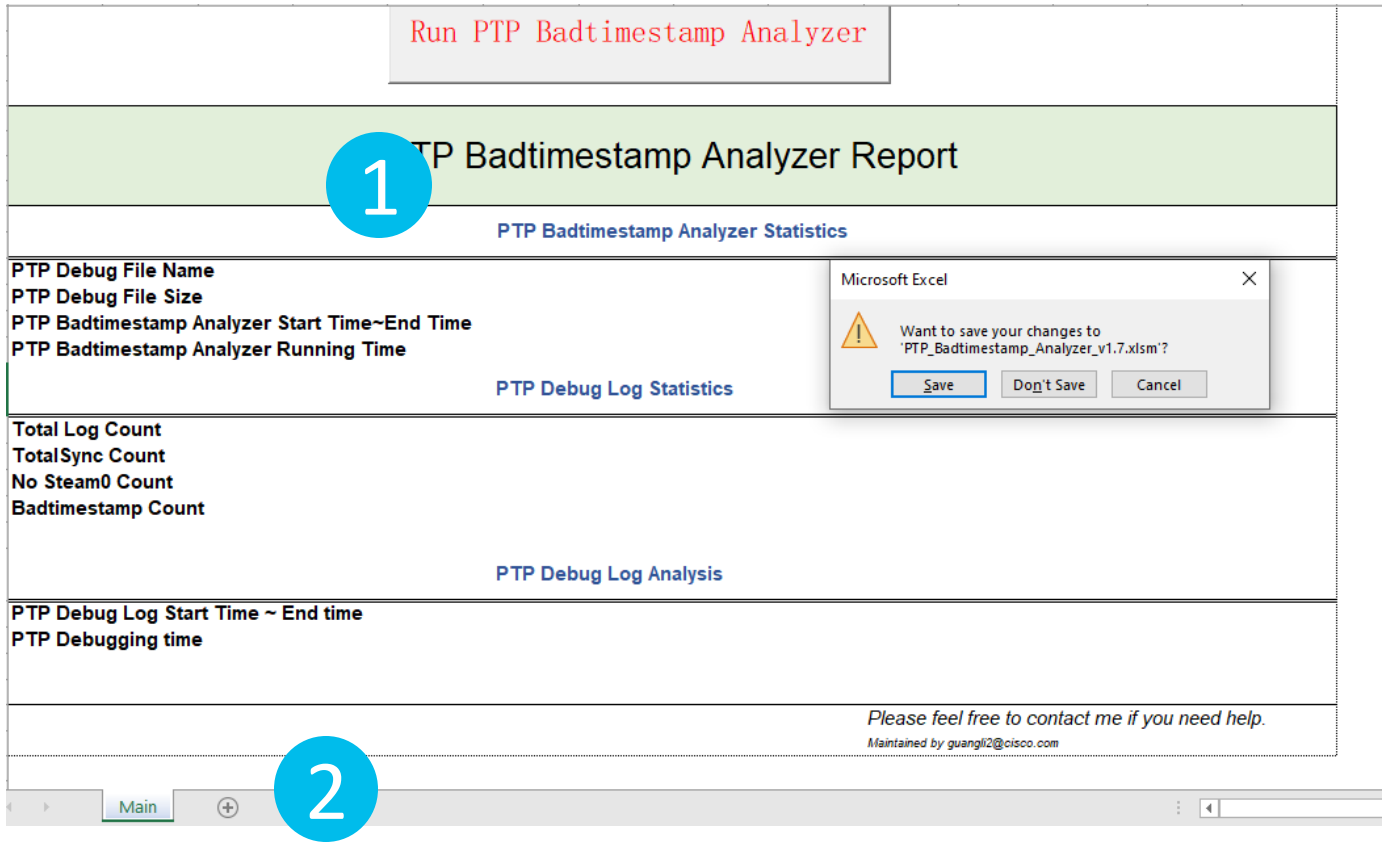


Question 2

When close PBA, data will be saved?

Answer 2

PBA clears PBA Report and data Sheet, When close PBA.



The bridge to possible

Thank you