

Our tv项目combo 换台速度分析

市场反馈该项目同频点加密节目换台速度慢，加时间点分析如下：

```
320 -----test result, times=12-----
321 ?key_start      : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
322 ?play_end       : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
323 ?pat_come        : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
324 ?request_pat     : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
325 ?start_decoder   : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
326 ?video_show      : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
327 ?vid_sync        : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
328 ?pcr_come        : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
329 ?key_send        : average=[0001]ms: 0001,0003,0001,0002,0002,0001,0001,0001,0000,0001,0001,0001,
330 ?SUB_Stop        : average=[0003]ms: 0004,0004,0002,0004,0002,0004,0002,0002,0001,0002,0002,0002,
331 ?Stop_Channel    : average=[0004]ms: 0005,0005,0003,0006,0003,0006,0002,0003,0002,0002,0002,0003,
332 ?set_freq        : average=[0015]ms: 0016,0014,0014,0017,0013,0016,0013,0015,0013,0013,0014,0013,
333 ?tuner_lock      : average=[0015]ms: 0016,0014,0014,0017,0014,0016,0013,0015,0013,0013,0014,0013,
334 ?request_pmt     : average=[0016]ms: 0017,0015,0017,0019,0014,0017,0014,0015,0014,0014,0015,0014,
335 ?pmt_come        : average=[0135]ms: 0147,0142,0127,0159,0125,0164,0125,0129,0128,0124,0129,0131,
336 ?set_ecm_filter  : average=[0164]ms: 0175,0169,0157,0187,0153,0190,0154,0157,0157,0154,0159,0160,
337 ?set_avfilter    : average=[0205]ms: 0182,0177,0444,0198,0180,0200,0180,0203,0169,0165,0170,0171,
338 ?start_ecmflt    : average=[0206]ms: 0212,0207,0193,0228,0185,0231,0209,0189,0208,0209,0190,0217,
339 ?open_decoder    : average=[0330]ms: 0286,0287,0555,0315,0331,0315,0333,0367,0276,0272,0281,0302,
340 ?ecm_come        : average=[0272]ms: 0367,0419,0220,0272,0276,0245,0287,0199,0267,0350,0214,0235,
341 ?ECM_TO_LIB      : average=[0280]ms: 0435,0431,0221,0273,0276,0245,0288,0200,0268,0417,0216,0235,
342 ?SC_TRANSFER1    : average=[0287]ms: 0436,0432,0222,0274,0185,0246,0288,0190,0269,0594,0217,0238,
343 ?SC_TRANSFER3    : average=[0397]ms: 0635,0631,0434,0474,0403,0445,0165,0441,0168,0334,0422,0449,
344 ?SC_TRANSFER2    : average=[0397]ms: 0635,0631,0433,0473,0403,0445,0164,0441,0168,0332,0422,0448,
345 ?set_cw          : average=[0872]ms: 0921,0918,0768,0758,1154,0738,0778,1190,0754,1091,0708,0735,
346 ?Iframe_come     : average=[1913]ms: 1106,2036,2268,1473,1896,1894,2022,1765,1704,1804,2209,1977,
```

解读：

- 1、pmt 耗时约 100ms，结合 pmt 发送间隔 100ms，该时间正常，无优化空间；（见图中 request_pmt ~ pmt_come 的时间）
- 2、设置 ecm filter 到 ecm 到来耗时 100ms，结合 ecm 间隔 100ms，该时间正常，无优化空间；（见图中 set_ecm_filter ~ ecm_come）
- 3、卡数据交换耗时 500ms，主要是进行了多次数据交换，当写入长度为 153 字节的数据时，耗时约 200ms，具体时间消耗如下：

```
290 ?15:37:29:473 restart ecm, data=0x81
291 ?15:37:29:474 1. ECM_TO_LIB      time=382 ms
292 ?15:37:29:507 1. SC_TRANSFER1    time=442 ms
293 ?15:37:29:555 CHDRV_SC_DataExchangeRaw#1860 size=12
294 ?15:37:29:555 [0xa576e6e5] : PLAYREC_PlayStart(0):OUT 0,2- OK
295 ?15:37:29:555 1. SC_TRANSFER2    time=452 ms
296 ?15:37:29:555 1. SC_TRANSFER3    time=453 ms
297 ?15:37:29:555
298 ?15:37:29:555 --xx---x-x--CHAPP_StartChannel----959-----
299 ?15:37:29:555 1. open_decoder    time=455 ms
300 ?15:37:29:555 >>[CHAPP_StartChannel]<END----->
301 ?15:37:29:555
302 ?15:37:29:556 --xx---x-x--CHAPP_NewChannel----1501-----
303 ?15:37:29:557
304 ?15:37:29:564 --xx---x-x--CHAPP_NewChannel----1522-----
305 ?15:37:29:587 CHDRV_SC_DataExchangeRaw#1860 size=153
306 ?15:37:29:859 >>=====begin=====CHAPP_DBASE_UPDATE_ALL[0]=====
307 ?15:37:29:971 CHDRV_SC_DataExchangeRaw#1860 size=12
308 ?15:37:30:035 CHDRV_SC_DataExchangeRaw#1860 size=12
309 ?15:37:30:067 CHDRV_SC_DataExchangeRaw#1860 size=12
310 ?15:37:30:115 CHDRV_SC_DataExchangeRaw#1860 size=12
311 ?15:37:30:115 1. set_cw          time=1018 ms
312 ?15:37:30:115 CHMID_NVCA_secSetClearTextKey#931 setcw
313 ?15:37:30:115 CHMID_NVCA_secSetClearTextKey#931 setcw
```

共 6 次数据交换，才能设置 CW，这个是由 ca 决定的，无法修改。为确认问题，对比 mstar 7C75 nagra 的卡交换数据，消耗时间一样：

```

474 [14:32:09:497]=====iccT1RawExchange in xSendLen=0xca=====
475 [14:32:09:779]=====iccT1RawExchange out E_SC_OK pxReplyLen=0xb6=====
476 [14:32:14:513]=====iccT1RawExchange in xSendLen=0xca=====
477 [14:32:14:785]=====iccT1RawExchange out E_SC_OK pxReplyLen=0xb6=====
478 [14:32:19:422]=====iccT1RawExchange in xSendLen=0xca=====
479 [14:32:19:694]=====iccT1RawExchange out E_SC_OK pxReplyLen=0xb6=====
480 [14:32:24:444]=====iccT1RawExchange in xSendLen=0xca=====
481 [14:32:24:712]=====iccT1RawExchange out E_SC_OK pxReplyLen=0xb6=====
482 [14:32:29:445]=====iccT1RawExchange in xSendLen=0xca=====
483 [14:32:29:716]=====iccT1RawExchange out E_SC_OK pxReplyLen=0xb6=====
484 [14:32:34:465]=====iccT1RawExchange in xSendLen=0xca=====

```

4、从设置 `cw` 到 `i` 帧出来，耗时约 1100ms，见图中 `set cw~iframe come`。这个是主要消耗时间，打印 `i` 帧间隔如下：

[illegible]

从图中看出，1 帧间隔约为 1200ms。

5、总体分析:

pmt 100ms + ecm 100ms + smart card 500ms + l frame 1200ms = 1900ms, 再加上必要的其他损耗, 整个换台时间应在 1500ms ~ 2500ms 之间都属于正常合理值。

通过上述分析可以看出,可提升的空间并不大,CA机制和1帧间隔是硬性环节,无法绕过。

尝试搜台时记录下 ecm PID, 换台时不去等待 pmt, 而是根据 ecm pid 自己组建 PMT 表后送入 CA, 省掉搜索 PMT 的时间, 修改后略有改善, 测试如下:

```

?-----test result, times=12-----
?key_start      : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
?play_end       : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
?start_decoder  : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
?video_show     : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
?vid_sync       : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
?pcr_come       : average=[0000]ms: 0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,0000,
?key_send       : average=[0001]ms: 0001,0001,0001,0002,0001,0000,0000,0001,0000,0001,0000,0001,
?SUB_Stop       : average=[0003]ms: 0003,0002,0002,0004,0004,0002,0001,0002,0002,0003,0001,0003,
?StopChannel    : average=[0004]ms: 0004,0003,0003,0004,0005,0003,0002,0002,0002,0004,0002,0004,
?pat_come       : average=[0018]ms: 0018,0017,0018,0018,0020,0018,0018,0017,0016,0017,0017,0018,
?request_pmt    : average=[0018]ms: 0018,0017,0018,0017,0020,0017,0017,0017,0016,0017,0016,0017,
?request_pat    : average=[0018]ms: 0018,0017,0018,0018,0020,0017,0018,0017,0016,0017,0017,0018,
?pmt_come       : average=[0018]ms: 0018,0017,0018,0018,0020,0018,0018,0017,0016,0017,0017,0018,
?tuner_lock     : average=[0017]ms: 0018,0016,0017,0017,0020,0017,0017,0016,0016,0017,0016,0017,
?set_freq       : average=[0017]ms: 0018,0016,0017,0017,0020,0017,0017,0016,0016,0017,0016,0017,
?set_ecm_filter : average=[0086]ms: 0084,0087,0085,0087,0088,0087,0085,0085,0085,0087,0085,0090,
?start_ecmflt   : average=[0118]ms: 0115,0119,0116,0119,0120,0118,0116,0117,0118,0119,0116,0123,
?ecm_come       : average=[0172]ms: 0144,0204,0143,0199,0164,0197,0154,0144,0191,0160,0197,0149,
?ECM_TO_LIB     : average=[0174]ms: 0145,0206,0145,0201,0164,0206,0155,0145,0192,0160,0199,0150,
?SC_TRANSFER1   : average=[0171]ms: 0146,0206,0146,0202,0165,0207,0155,0097,0193,0161,0200,0150,
?set_avfilter   : average=[0159]ms: 0158,0163,0158,0159,0162,0159,0160,0159,0158,0158,0158,0164,
?open_decoder   : average=[0259]ms: 0264,0266,0259,0257,0259,0255,0265,0260,0255,0254,0252,0263,
?SC_TRANSFER2   : average=[0362]ms: 0368,0408,0365,0403,0400,0407,0357,0107,0396,0363,0400,0371,
?SC_TRANSFER3   : average=[0362]ms: 0369,0408,0365,0403,0401,0407,0357,0107,0397,0364,0400,0372,
?set_cw         : average=[0677]ms: 0664,0705,0652,0699,0701,0698,0657,0652,0683,0649,0698,0663,
?Iframe come    : average=[1622]ms: 0862,0995,1268,1154,1674,1919,1012,2211,1718,2203,1748,1941,

```

整体提升约 100~300ms，人眼很难察觉到提升，且需要做好充分测试，有一定的风险。
仅供参考。

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