



User Guide for New PSIP Streaming Module (Software Mux)

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Introduction

Starting from version 2.3.4, PSIP Pro. has beta released new streaming module (internally referenced as “software multiplexer”). This new streaming module employs so-called section static multiplexing algorithm that further multiplexes the different PIDs of PSIP tables into a multiplex based on the derivation on their cycle times respectively. This new software multiplexing technique introduces highly accurate and stable table repetition rates and the maximum level of avoidance of bursts of the tables that run on small repetition rates (e.g. MGT, PAT, PMT, etc), it also improves the efficiency of the bandwidth usage for streaming PSIP table.

This user guide mainly focuses on the typical setup (HOWTO) for the table cycle times, considering the number of days of program data, the output bandwidth, and the number of virtual channels.

The recommended cycle times are relative values and are comprehensively depending on the combination of the number of EIT/ETTs being transmitted, the number of virtual channels, and whether PAT and PMT are enabled, as well as the output bit rate value that is assigned to the output ASI card.

If PAT and PMT are enabled in the transmission, the output bit rate shall be set to no less than 400 kbps.

Principle for PSIP Tables

MGT – one of the fastest tables. PSIP Pro.’s recommended cycle time is 100 ms (milliseconds) while the ATSC regulated maximum is 150 ms. This table shall be usually set to 100 ms, unless the usage of the bandwidth is highly concerned, for which case, the cycle time can go up to 125 ms.

TVCT - PSIP Pro.’s recommended cycle time is 300 ms (milliseconds) while the ATSC regulated maximum is 400 ms. The range between 300 ms to 350 ms fits well into the new streaming module. Any value between 350 ms to 400 ms may cause slight fluctuation when the output bit rate is too low.

EIT- 0 - PSIP Pro.'s recommended cycle time is 400 ms (milliseconds) while the ATSC regulated maximum is 500 ms. This table shall be usually set to no greater than 400 ms. The maximum fluctuation shall be under +/- 10 ms.

STT - PSIP Pro.'s recommended cycle time is 875 ms (milliseconds) while the ATSC regulated maximum is 1000 ms (1 s). Any number between 875 to 900 is recommended. The maximum fluctuation shall be under +/- 15 ms.

EIT – 1 - PSIP Pro.'s recommended cycle time is 2500 ms (milliseconds) while the ATSC regulated maximum is 5000 ms. This table shall be usually set to no greater than 2500 ms, unless the usage of the bandwidth is highly concerned, in which case, the cycle time can go up to 3000 ms.

EIT 2 to k - PSIP Pro.'s recommended cycle time is 58000 ms (milliseconds) while the ATSC regulated maximum is 60000 ms (one minute).

ETT - PSIP Pro.'s recommended cycle time is 58000 ms (milliseconds) while the ATSC regulated maximum is 60000 ms (one minute).

RRT – optional table. PSIP Pro.'s recommended cycle time is 55000 ms (milliseconds) while the ATSC regulated maximum is 60000 ms (one minute).

Principle for MPEG Tables

PAT – The maximum cycle time allowed by protocol is 100 ms. PSIP Pro. recommends 78 ms. As stated in the principle, the effective cycle time for PAT heavily depends on the other three factors – number of days of program data, the total output bit rate, and the number of virtual channels. For instance, as shown the matrix (M1.1), any number between 80 ms to 78 ms is a good number for:

- 4 EITs up to 1 day of EITs
- Output bit rate: 400 bps to 500 bps
- 1 to 3 virtual channels

The cycle time shall be tuned down when number of EITs or virtual channels increases, or output bit rate decreases. For example, 75 ms may lead to more accurate arrival time at receiver and less fluctuation range when outputting 4 days of EITs (32 EITs), and / or there are three virtual channels.

The maximum fluctuation for PAT shall be under +/- 10 ms.

PMT - The maximum cycle time allowed by protocol is 100 ms. PSIP Pro. recommends 75 ms. If only one virtual channel is transmitted, PMT is no difference than PAT in terms of the volume of data, as it typically has only one packet per table. However, setting the cycle time for PMT becomes tricky when running multiple virtual channels (for example, 3 channels –HD, SD, and weather). In this case, PMT will have multiple packets (three in this case) per table. It may utilize a significant portion (even greater than the sum of all

PSIP tables plus PAT) of the whole output bandwidth. The maximum fluctuation shall be under +/- 10 ms.

The cycle time shall be tuned down when number of virtual channels increases, or output bit rate decreases, or for more EITs/ETT. For example, 70 ms may lead to more accurate arrival time at receiver and less fluctuation range when outputting 3 virtual channels, 650kbps, and up to 4 days worth of programs.

Sample Recommended Bit rate / number of EITs

PAT / PMT time (ms)	Number of EITs	ASI bit rate (kbps)	# of VCs
85/85	4	400	1
85/85	4 - 8	500	1
80/80	8 - 16	500	1
78/75	4 - 8	500	3
78/70	8 - 32	600	3
78/70	4 - 8	700	4
78/65	32 - 64	700	3
78/65	8 - 32	750	4

M1.1

M1.1 shows the sample setup for PAT and PMT under certain environment*. When the number of EITs and virtual channels are fixed, adjusting and balancing the bit rate and PAT/PMT cycle time is the way to achieve the goal – accurate table repetition rate while keeping as low bandwidth usage as possible.

* The other factor that affects the performance of this new streaming module is the hardware. The typical system for running PSIP Pro. that is equipped with the software mux shall has, as recommended, a single processor of Pentium 4 2.8 GHz and 512MB memory. Higher performance processor (e.g. Xeon, and / or Duo-Core, and / or HyperThread, etc) and more memory is suggested if there runs other applications / resource-hungry services which share the system resources with PSIP Pro.