Synchronization

This section describes how synchronization is achieved.

- TDT data is stored as a continuous data (starting from start of recording)
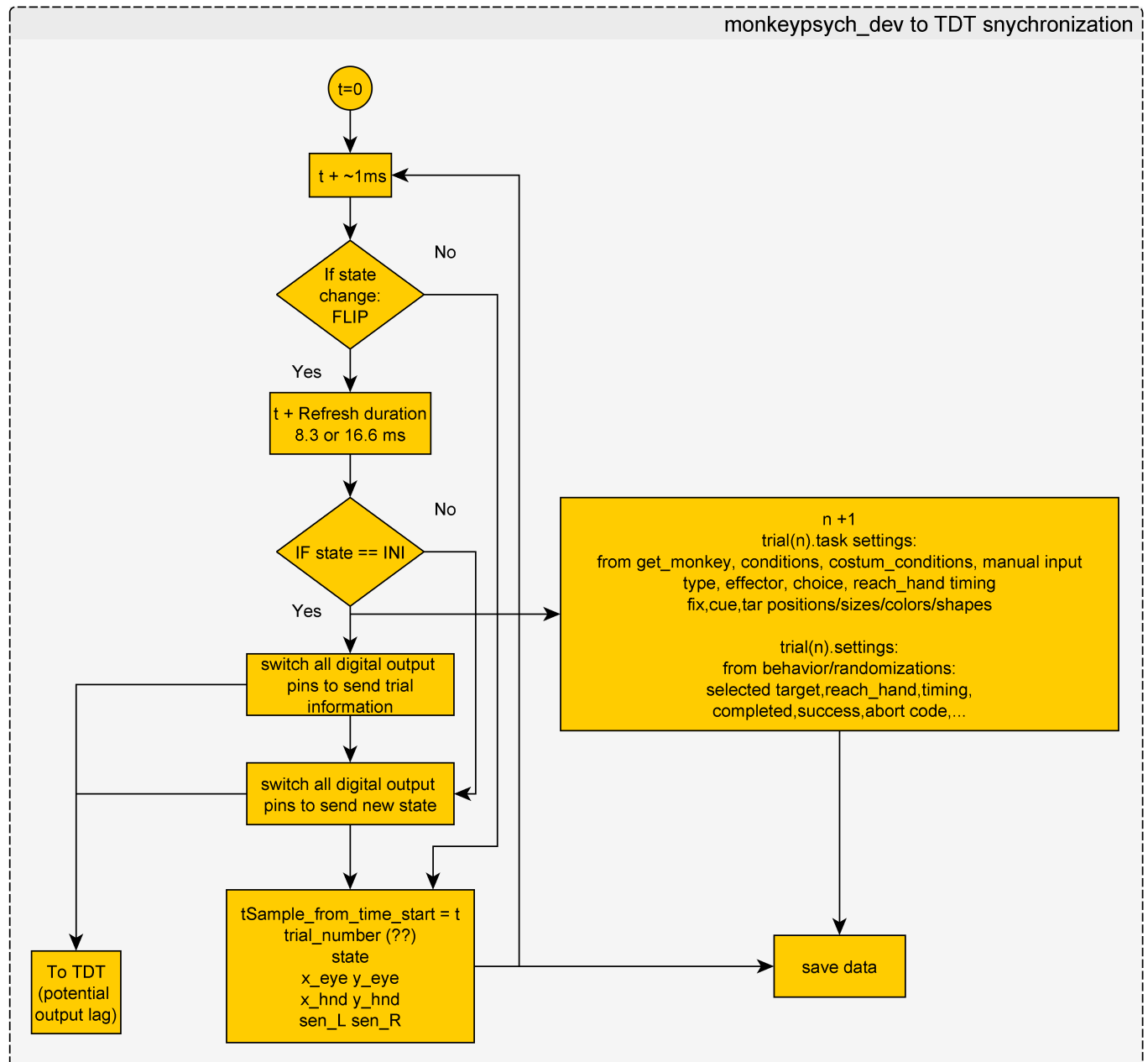- behavioral data is stored per trial (starting from first trial)

For combining both, we first convert TDT data to trial format (function TDT_trial_struct.m) preferentially using epocs store (Tnum and SVal) information.
Note: There is a flag for using the continous state information stream (stream_state_info), but it is permanently turned off, as the epoc information is already extracted from the continuous state information within the TDT circuit.
Importantly, trial start reference is STATE 2 (fixation acquisition). Trial end is STATE 2 of the next trial. Therefore, ITI between trial 1 and 2 as well as STATE 1 (initiation) of trial 2 are found at the end of trial 1.
This also means that data recorded before 1st trial's state 2 can not be stored in the trial structure and is saved in a separate variable (First_trial_INI) instead. But first things first, how do we make sure we CAN synchronize TDT and behavioral data?

Synchronization during recording

monkeypsych_dev to TDT snychronization

t=0

t + ~1ms

If state change: FLIP

No

Yes

t + Refresh duration 8.3 or 16.6 ms

IF state == INI

No

Yes

switch all digital output pins to send trial information

n +1
trial(n).task settings:
from get_monkey, conditions, costum_conditions, manual input
type, effector, choice, reach_hand timing
fix,cue,tar positions/sizes/colors/shapes

trial(n).settings:
from behavior/randomizations:
selected target,reach_hand,timing,
completed,success,abort code,...

switch all digital output pins to send new state

To TDT (potential output lag)

tSample_from_time_start = t
trial_number (??)
state
x_eye y_eye
x_hnd y_hnd
sen_L sen_R

save data

Note that pins are only switched either to send trial information or after a state change (AND after the flip happened!) The idea is that both trial information and state information can be sent via the same channel. Details are described below.

Resulting 8 pin state signal

Values of 252 to 255 are preserved for indicating start of trial/state information and in-between trial information stoppers:

- 252: indicates start of trial information
- 254: in between trial information to define trialinfo packages

- 253: end of trial information
- 255: start of state information

Note that due to preserved values, a trial information package maximum value is limited. For example, to encode the date first package would be first 2 digits of the year, second package the last 2 digits of the year, third package the month and fourth package the day. That way none of the packages reaches a value of over 100. Trial information is sent during INI (state 1), during the other states the stat value reflects the current state.

Internal ROC deriving state onsets and trial information
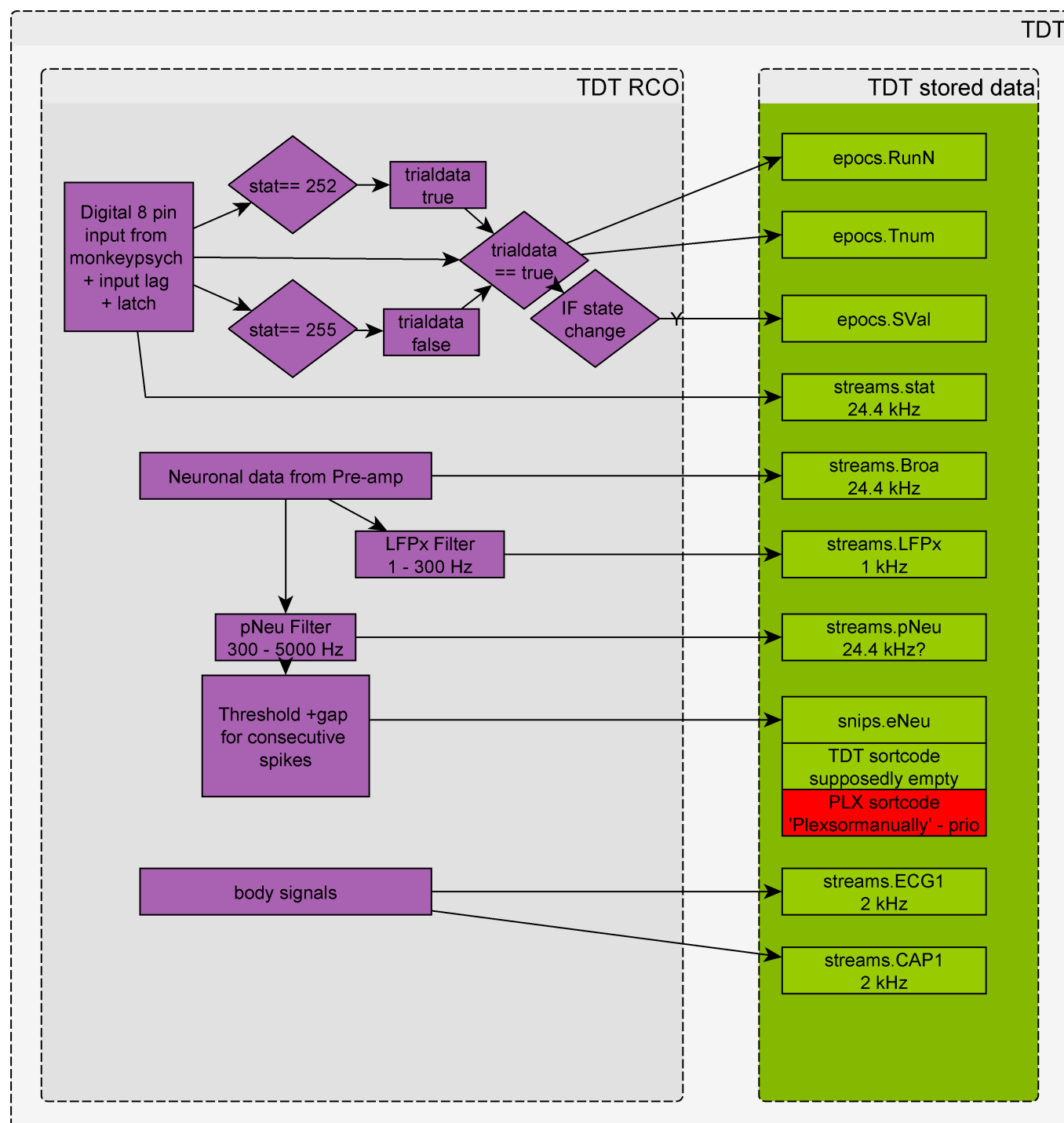
Snippet and Stream synchronization in the combined trial structure