

Reference design

Figure 1 1
 Figure 2 1
 Figure 3 2
 Figure 4 3
 Figure 5 3
 Figure 6 4
 Figure 7 5
 Figure 8 6
 Figure 9 6

Example

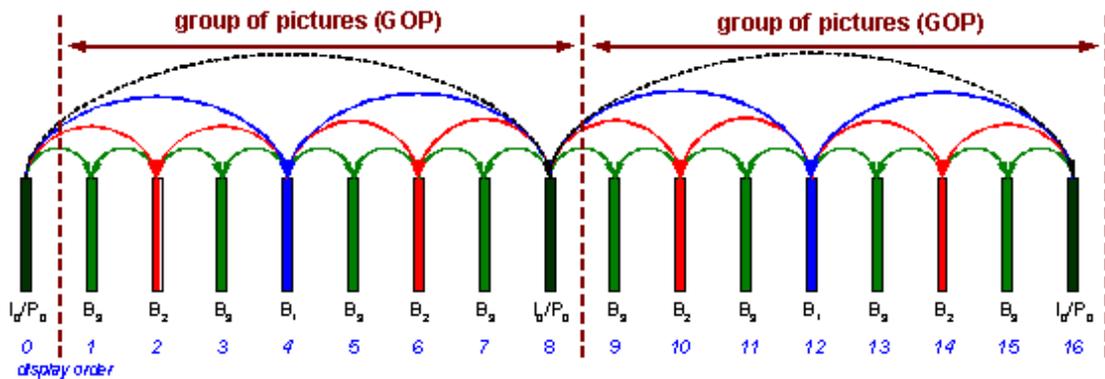


Figure 1

PTS	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DTS	0	4	3	5	2	7	6	8	1	12	11	13	10	15	14	16	9

Figure 2

Fig 1 is the example we explore for the proposed method.

Fig 2 lists the corresponding PTS & DTS of each frame.

The table in red lists the actual PTS in sequence when demuxing. It is, we should receive 0 firstly. Then comes by 8 (the start of next GOP), 4 (1st level B frame) 2 (2nd

sequence	0	8	4	2	1	3	6	5	7	16	12	10	9	11	14	13	15
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level B frame) 1 (3rd level B frame) ...

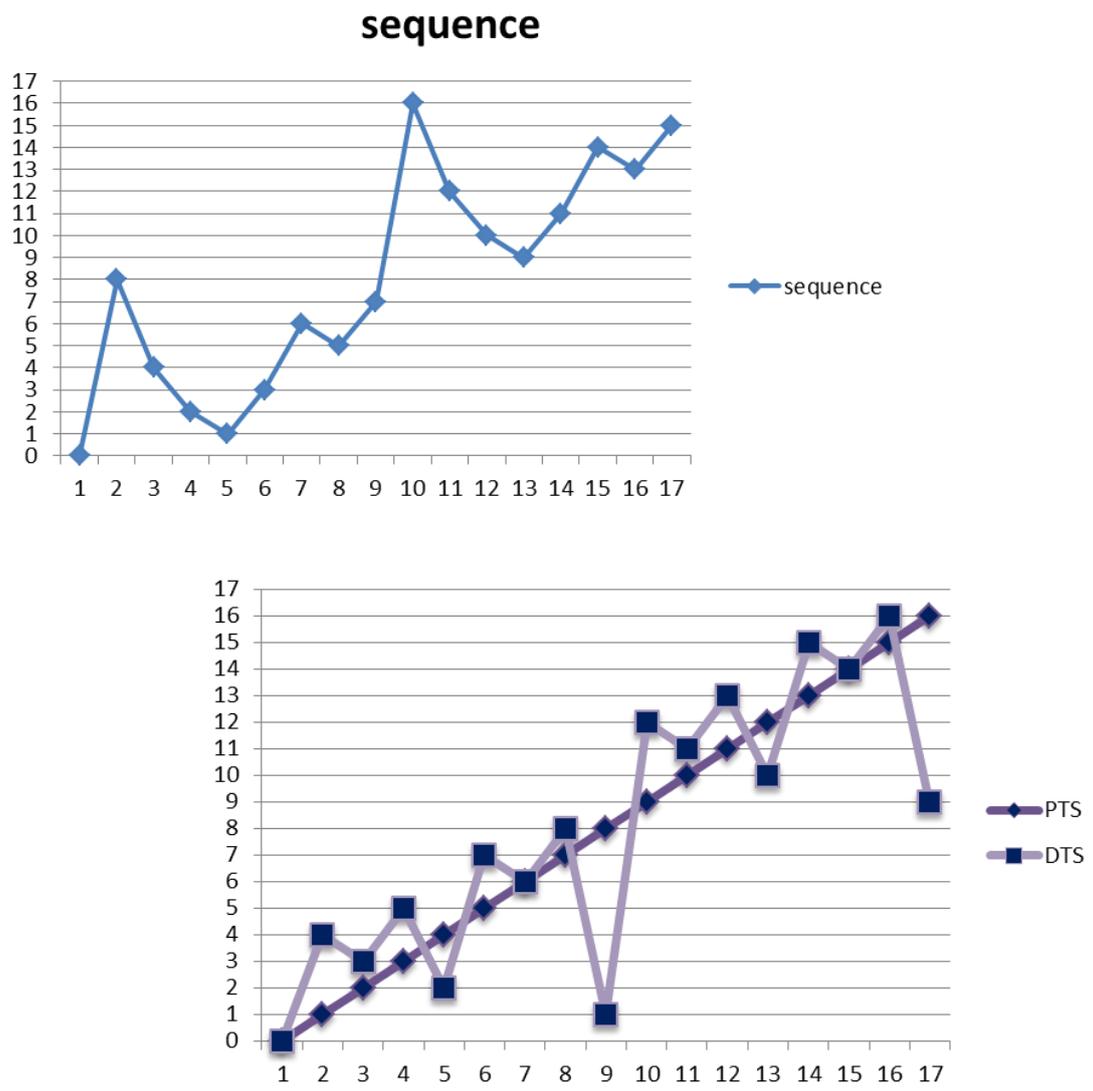


Figure 3

Issued case

		1	2	3	4	5	6	7	8	9	10	missed
0.5	→	0	8									None
1.5	→	0	8									1
2.5	→	0	8									1, 2
3.5	→	0	8									1, 2, 3
4.5	→	0	8									1, 2, 3, 4
5.5	→	0	8									1, 2, 3, 4, 5
6.5	→	0	8									1, 2, 3, 4, 5, 6
7.5	→	0	8									1, 2, 3, 4, 5, 6, 7
8.5	→	0	8	4	2	1	3	6	5	7	16	None

Red: dropped at the end of flow

Figure 4

Fig 4 indicates the issue we have now. One could check for this example **we may MISS at most 7 frames if stop is set to 7.5**. Fig 5 lists the original flow.

```

/* do time stamps, we do this first so that we can know when we
 * stepped over the segment stop position. */
timestamp = gst_ffmpeg_time_ff_to_gst(pkt.pts, avstream->time_base);
if (GST_CLOCK_TIME_IS_VALID (timestamp)) {
    stream->last_ts = timestamp;
}
duration = gst_ffmpeg_time_ff_to_gst(pkt.duration, avstream->time_base);
if (G_UNLIKELY (!duration)) {
    GST_WARNING_OBJECT (demux, "invalid buffer duration, setting to NONE");
    duration = GST_CLOCK_TIME_NONE;
}
.....
/* check if we ran outside of the segment */
if (demux->segment_stop != -1 && timestamp > demux->segment_stop)
    goto drop;

```

Figure 5

1st proposal

We list the two judgments of 1st proposal here firstly.

Criterion 1: If we have met two consecutive frames F1 & F2 and both of their PTS are greater than segment's stop.

Criterion 2: F2's PTS is greater than F1's PTS.

If bothe criterion 1 & 2 are satisfied, after F2 there is NOT a frame F whose PTS is less than F1.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0.5	→	0	8	4	2	1	3	6							
1.5	→	0	8	4	2	1	3	6							
2.5	→	0	8	4	2	1	3	6							
3.5	→	0	8	4	2	1	3	6	5	7					
4.5	→	0	8	4	2	1	3	6	5	7					
5.5	→	0	8	4	2	1	3	6	5	7	16				
6.5	→	0	8	4	2	1	3	6	5	7	16				
7.5	→	0	8	4	2	1	3	6	5	7	16	12	10	9	11
8.5	→	0	8	4	2	1	3	6	5	7	16	12	10	9	11
8	→	0	8	4	2	1	3	6	5	7	16	12	10	9	11

Green: dropped at renderer
Red: dropped at the end of flow

Figure 6

Take segment.stop = 4.5 for example; originally when meeting 2nd frame with PTS '8' we will go to drop. Therefore the frames with PTS = 1, 2, 3, 4 are all missed.

With the proposed method, only when reading the frames with PTS = 5 & 7 both the criterions are satisfied. Notice that for this case we passed down the frames with PTS = 0, 1, 2, 3, 4, 6, 8. **Among them 0, 1, 2, 3, 4, 8 are necessary for decoding but 6 is redundant. Since 6 & 8 will be dropped at renderer when checking segment's stop where, we don't need to care about even we pass them down.**

Please verify the correctness of 1st proposal by inspecting the given example.

The flowchart is given in fig 7 below.

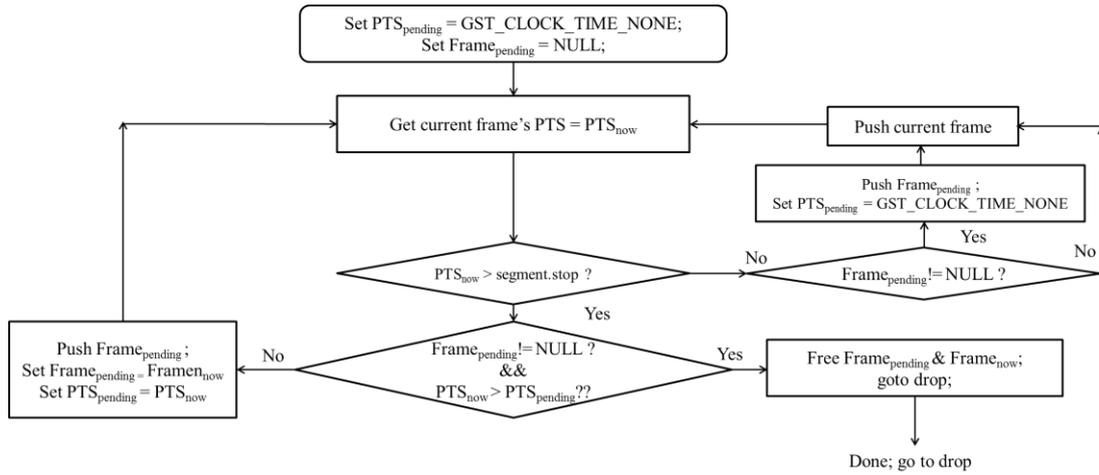


Figure 7

2nd proposal

We list the lemma on which 2nd proposal is based here firstly.

Lemma: If we have following sequence & $PTS(F2) > PTS(F1)$, then there is **NO** any frame F such that $PTS(F) < PTS(F1)$ within region 3.

*(region 1), F1, *(region 2), F2, *(region 3)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Save gain
0.5	→	0	8	4	2	[1	3]									-2
1.5	→	0	8	4	[2	1	3]									-1
2.5	→	0	8	4	2	1	[3	6]								-1
3.5	→	0	8	[4	2	1	3	6]								-3
4.5	→	0	8	4	2	1	3	6	[5	7]						-1
5.5	→	0	8	4	2	1	3	[6	5	7]						-2
6.5	→	0	8	4	2	1	3	6	5	[7	16]					-1
7.5	→	0	[8	4	2	1	3	6	5	7	16]					-5
8.5	→	0	8	4	2	1	3	6	5	7	16	12	10	[9	11]	-1
8	→	0	[8	4	2	1	3	6	5	7	16]					-5

Green: dropped at renderer
Red: dropped at the end of flow

Figure 8

Fig 8 lists the execution result as well as how many steps it saves compared with the 1st proposal.

We demonstrate the usage of this lemma by example when stop = 3.5 as well as the flowchart below.

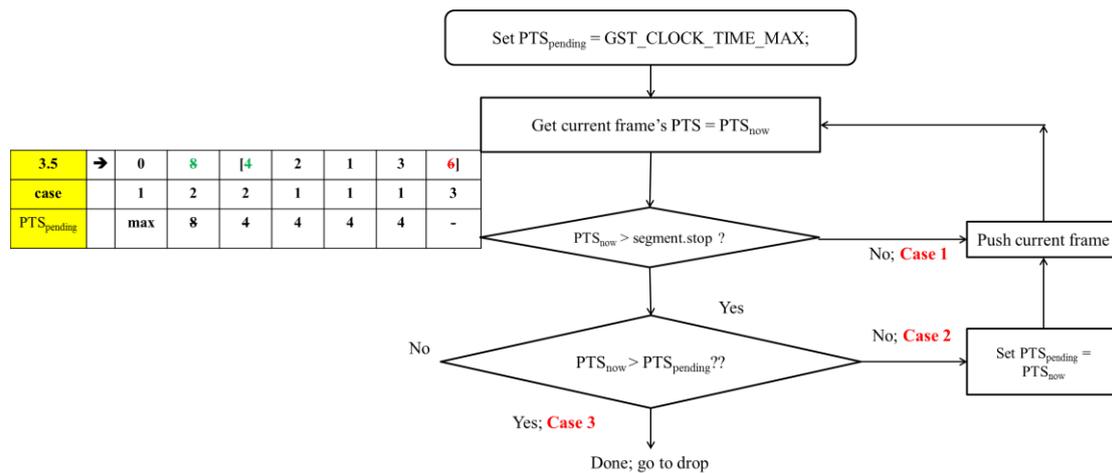


Figure 9

When demuxing 1st frame, PTS = 0; since PTS < stop, go to case 1.
 When demuxing 2nd frame, PTS = 8; since PTS >= stop & PTS_{pending} has not been assigned yet, goto case 2 (assign PTS_{pending} by 8).
 When demuxing 3rd frame, PTS = 4; since PTS >= stop & PTS_{pending} >= PTS_{now}, goto case 2 (replace PTS_{pending} by 4)
 When demuxing 4th frame, PTS = 2; since PTS < stop, goto case 1
 When demuxing 5th frame, PTS = 1; since PTS < stop, goto case 1
 When demuxing 6th frame, PTS = 3; since PTS < stop, goto case 1
 When demuxing 7th frame, PTS = 6; since PTS >= stop, since PTS >= stop & PTS_{pending} < PTS_{now}, goto case 3 (complete).