

FIG. 1

10

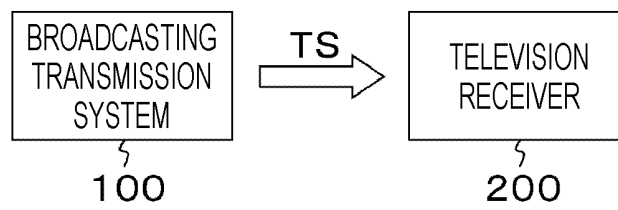


FIG. 2

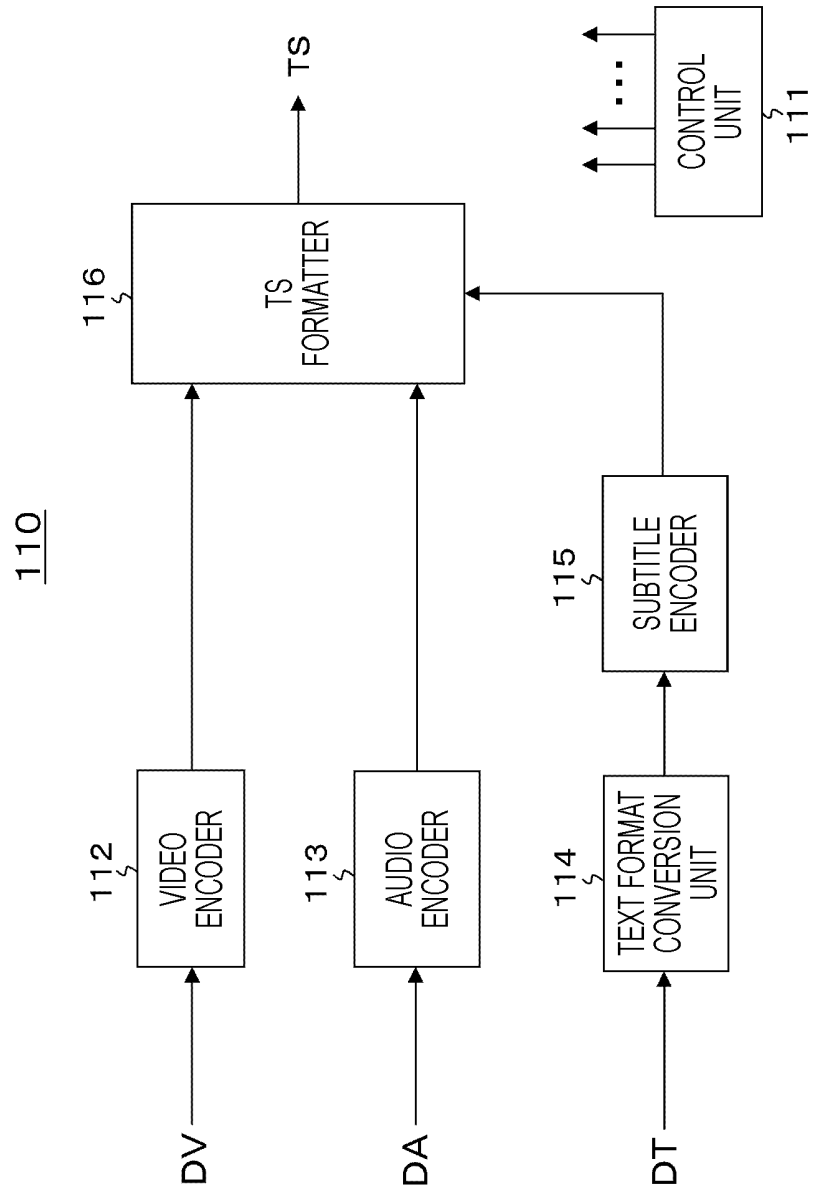


FIG. 3

TTML STRUCTURE

```

<tt xml:lang="" xmlns="http://www.w3.org/ns/ttml">
  <head>
    <metadata/>
    <styling/>
    <layout/>
  </head>
  <body/>
</tt>

```

FIG. 4

TTML Metadata

(a)

```

<metadata xmlns:ttml="http://www.w3.org/ns/ttml#metadata">
  <ttml:title>Timed Text TTML Example</ttml:title>
  <ttml:copyright>The Authors (c) 2006</ttml:copyright>
</metadata>

```

TTML Styling

(b)

```

<styling xmlns:tts="http://www.w3.org/ns/ttml#styling">
  <!-- s1 specifies default color, font, and text alignment -->
  <style xml:id="s1"
    tts:color="white"
    tts:fontFamily="proportionalSansSerif"
    tts:fontSize="22px"
    tts:textAlign="center"
  />
  <!-- alternative using yellow text but otherwise the same as style s1 -->
  <style xml:id="s2" style="s1" tts:color="yellow"/>
  <!-- a style based on s1 but justified to the right -->
  <style xml:id="s1Right" style="s1" tts:textAlign="end" />
  <!-- a style based on s2 but justified to the left -->
  <style xml:id="s2Left" style="s2" tts:textAlign="start" />
</styling>

```

TTML Layout

(c)

```

<layout xmlns:tts="http://www.w3.org/ns/ttml#styling">
  <region xml:id="subtitleArea"
    style="s1"
    tts:extent="560px 62px"
    tts:padding="5px 3px"
    tts:backgroundColor="black"
    tts:displayAlign="after"
  />
</layout>

```

FIG. 5

TTML Body

```
<body region="subtitleArea">
  <div>
    <p xml:id="subtitle1" begin="3s" end="6s">
      I'm going to the station now.
    </p>
  </div>
</body>
```

FIG. 6

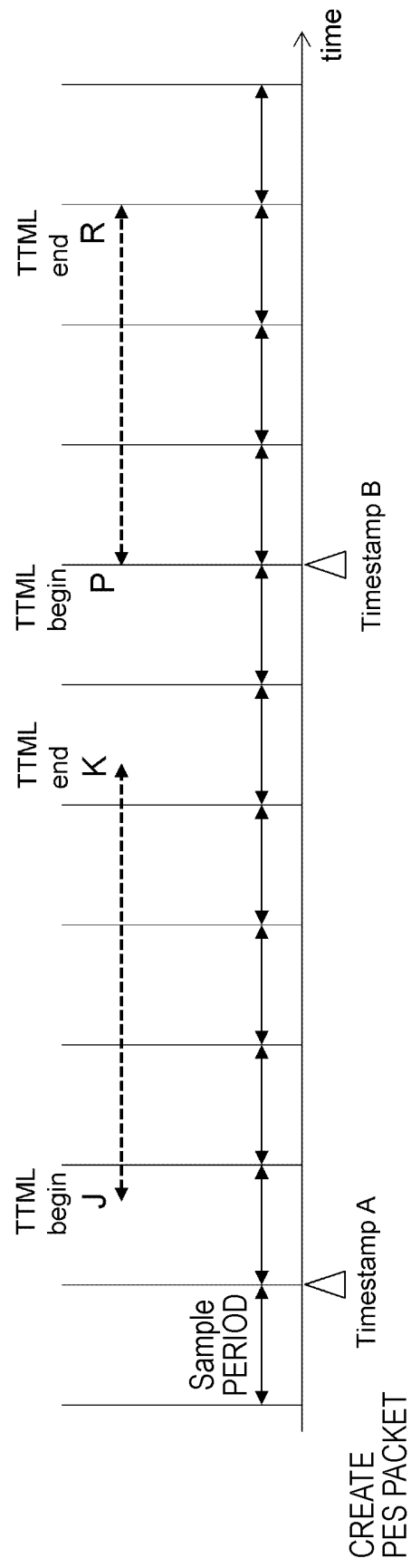


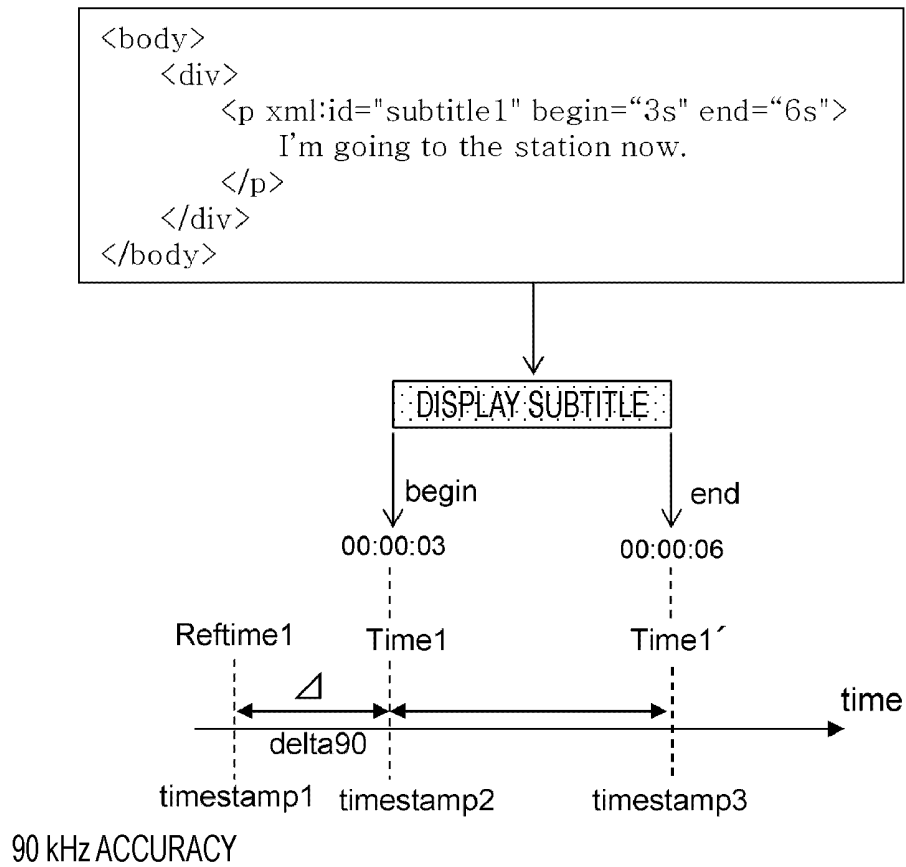
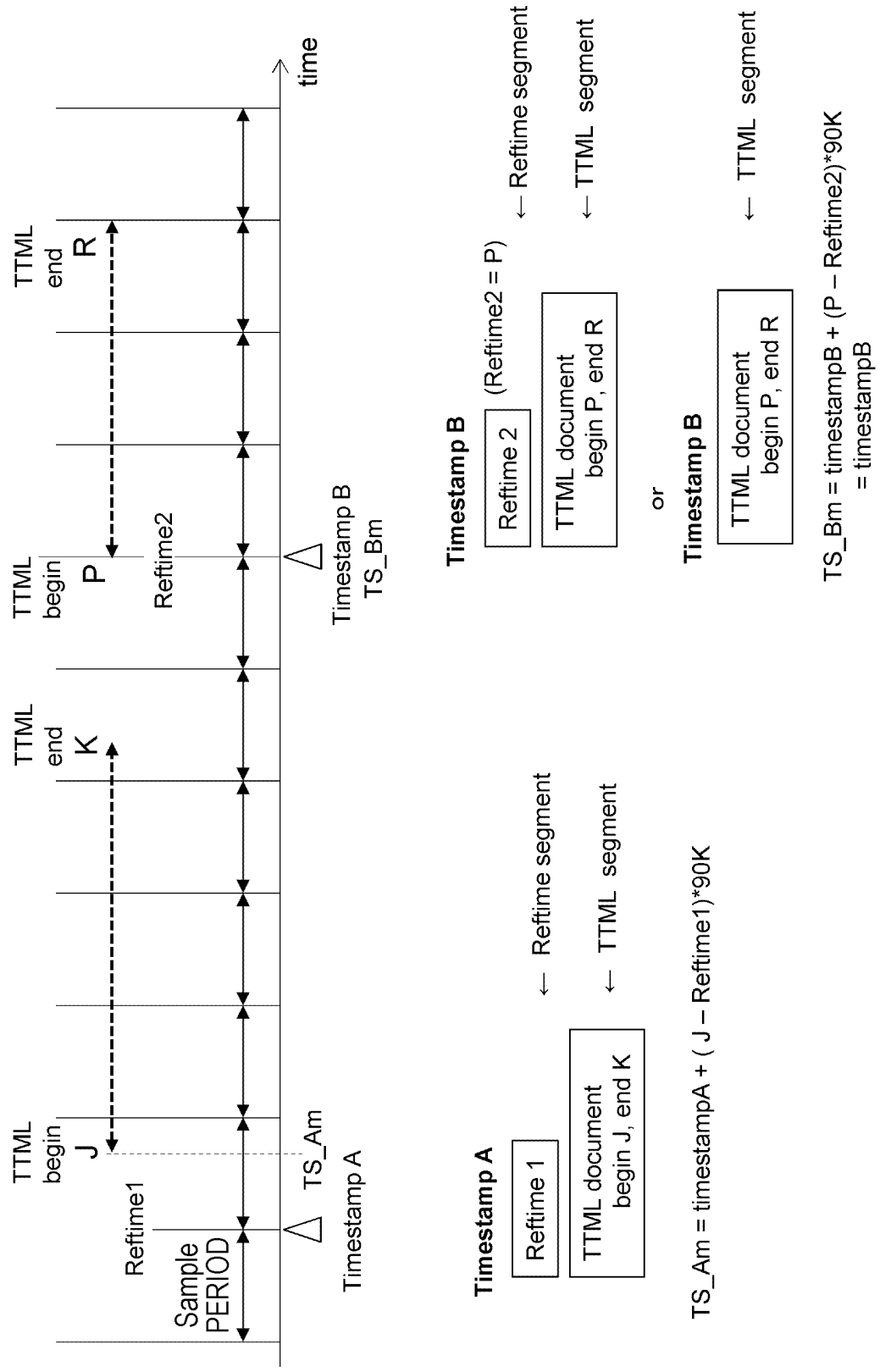
FIG. 7

FIG. 8



8/19

FIG. 9

IN A CASE WHERE retime 1 IS NOT SAME AS retime 2, $\alpha \neq \beta$
IN A CASE WHERE retime 1 IS SAME AS retime 2, $\alpha = \beta$

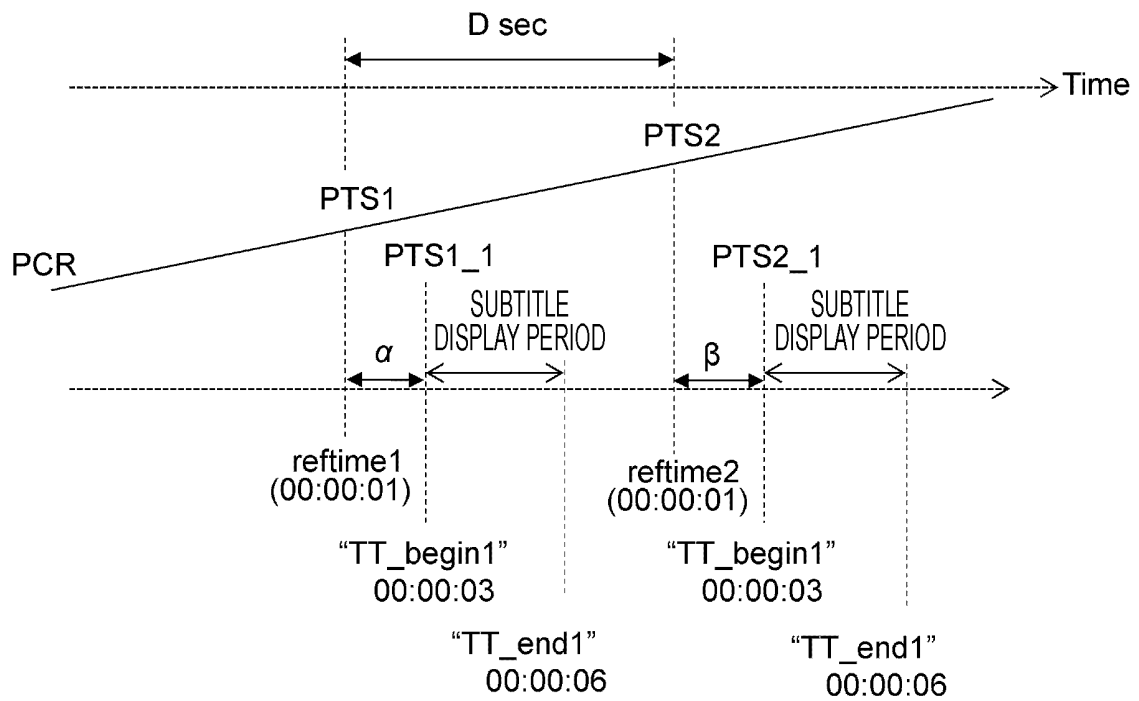


FIG. 10

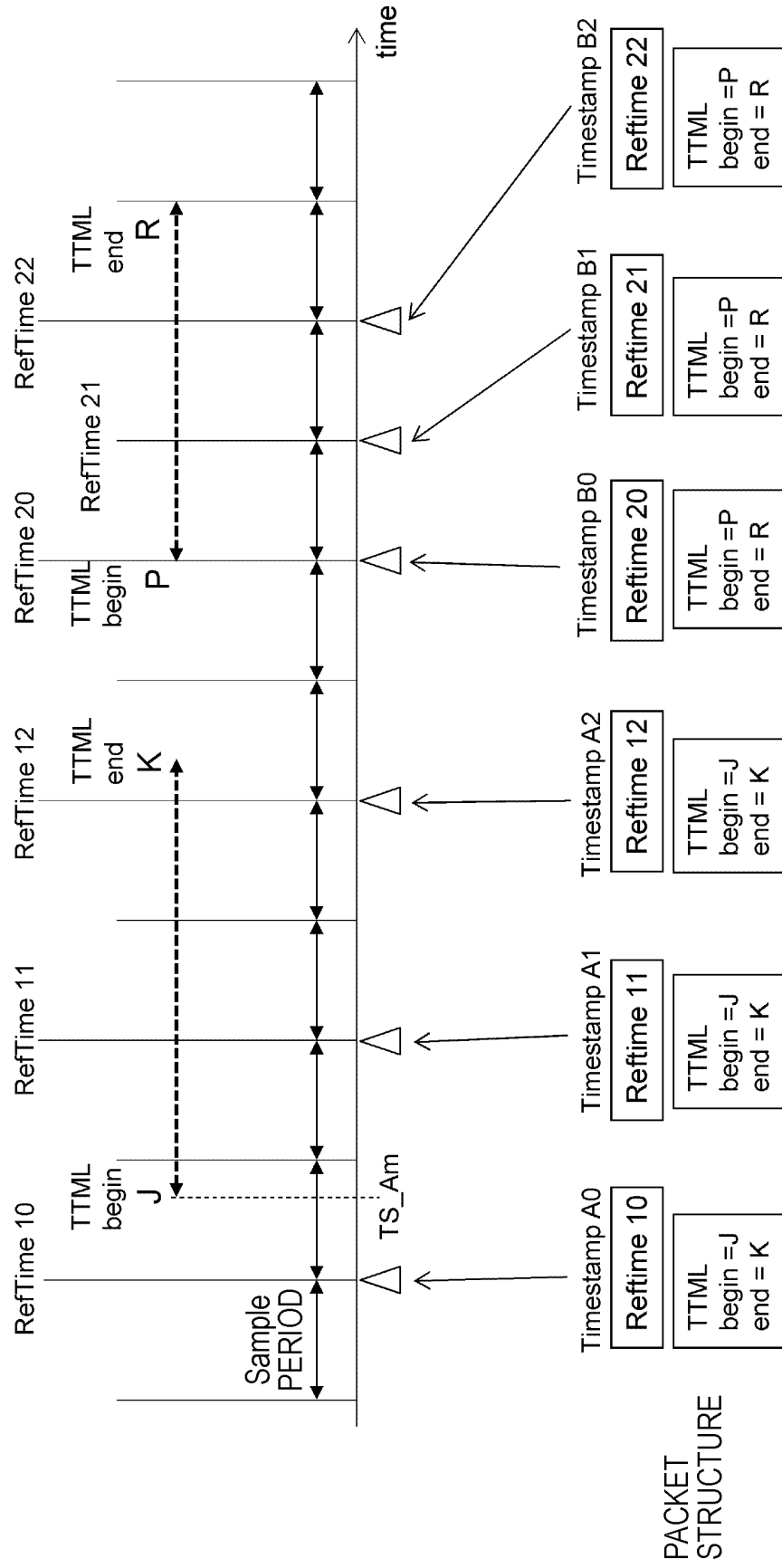


FIG. 11

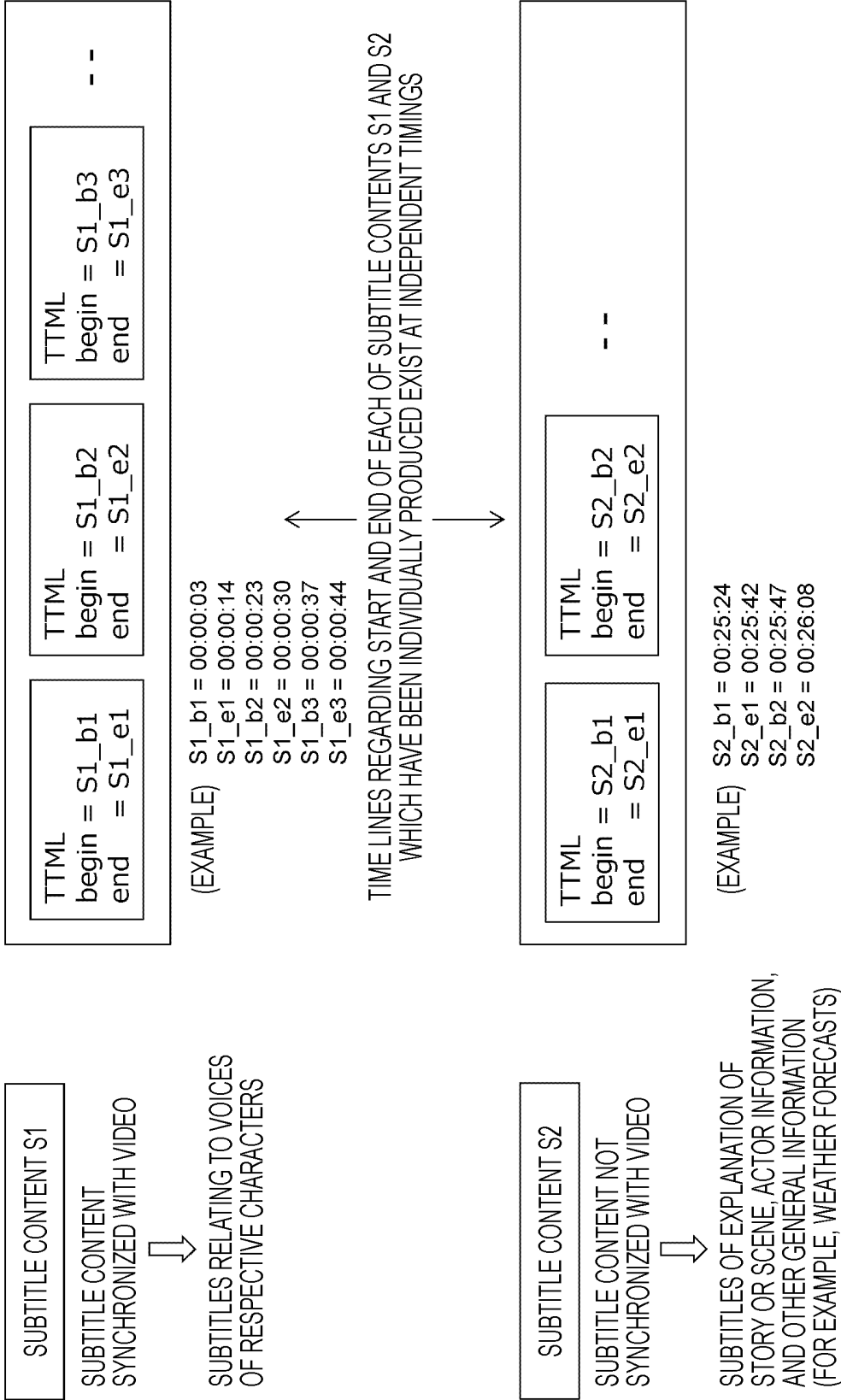


FIG. 12

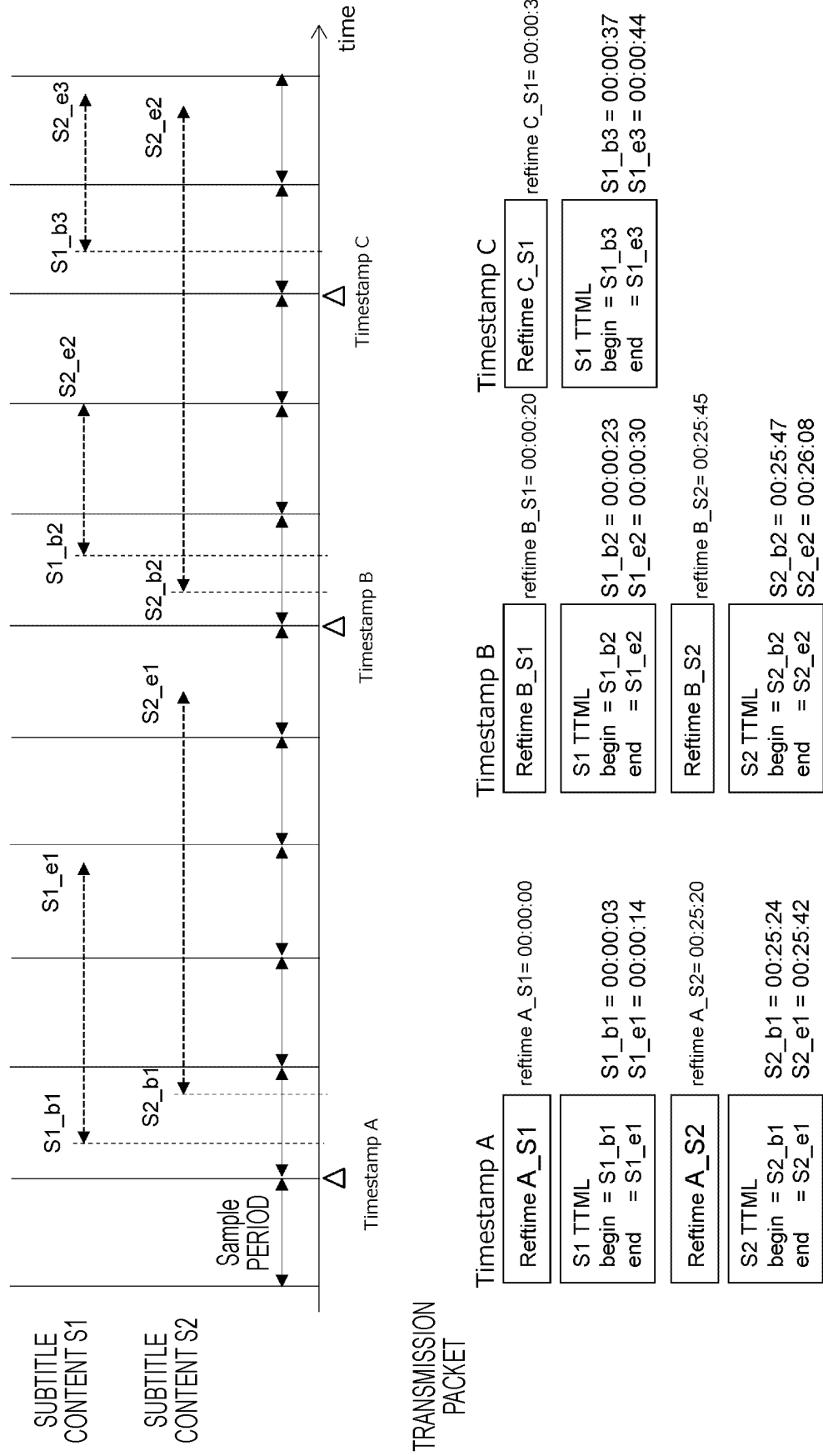


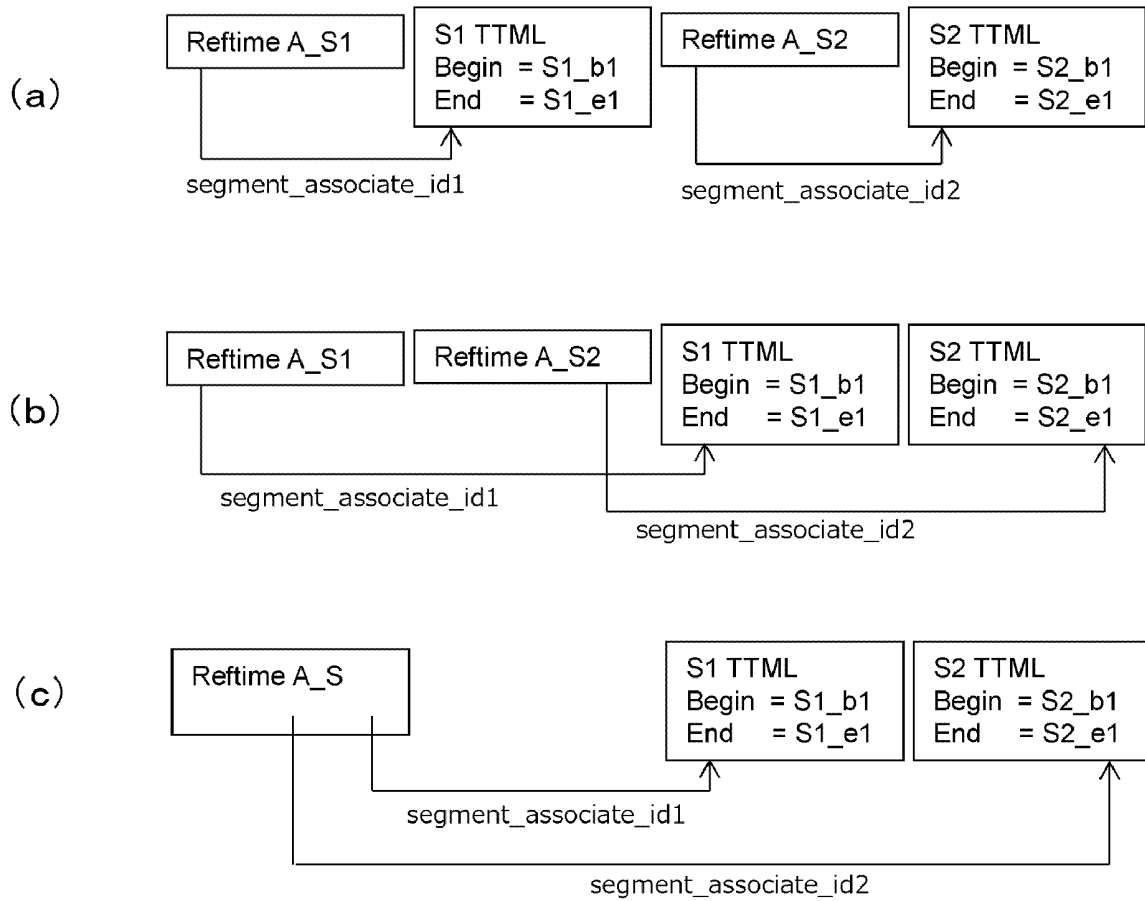
FIG. 13

FIG. 14

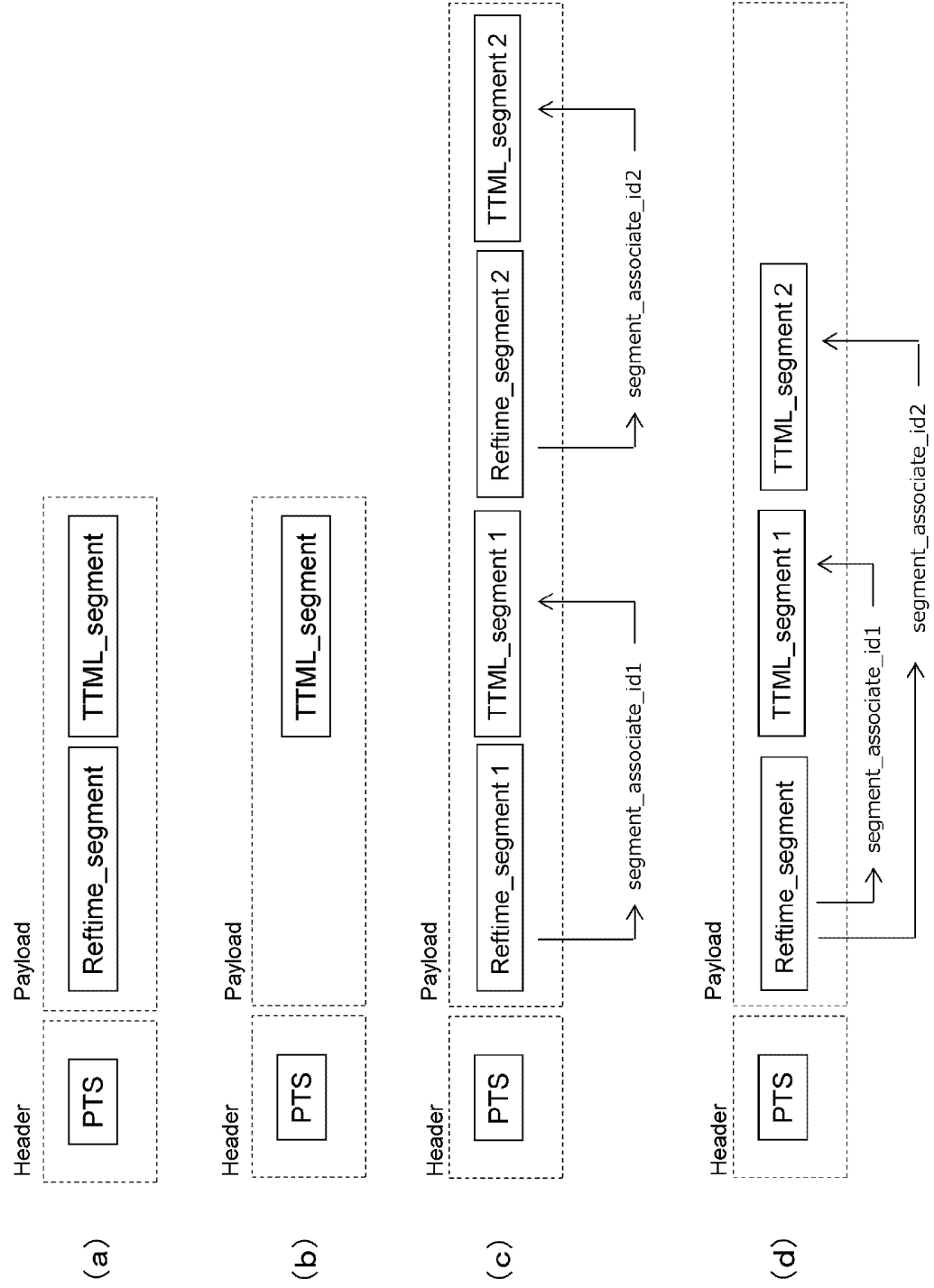


FIG. 15

Syntax	Size	Type
PES_packet() {		
PES_startcode_prefix	24	bslbf
stream_id	8	bslbf
PES_packet_length	16	uimbsf
Optional_PES_header()		
PES_packet_data_byte	8	
}		

(a)

Syntax	Size	Type
PES_data_byte_field() {		
data_identifier	8	bslbf
subtitle_stream_id	8	bslbf
while nextbits() == '0000 1111' {		
TimedTextSubtitling_segments()		
}		
end_of_PES_data_field_marker	8	"0xff"
}		

(b)

PES_startcode_prefix 0x000001
Stream_id 1011 1101 private stream1

FIG. 16

TT_subtitle segment_type	DESCRIPTION OF KINDS
0xA0	TTML_segment
0xA1	Reftime_segment
others	Reserved for future use

FIG. 17

Syntax	Size	Type
TTML_segment() {		
sync_byte	8	bslbf
segment_type	8	bslbf
segment_length	16	uimsbf
TTML_version_number	4	uimsbf
reserved	4	bslbf
segment_associate_id	8	uimsbf
segment_payload()		
}		

(a)

segment_associate_id (8bits) USED TO IDENTIFY MUTUALLY ASSOCIATED SEGMENTS

(b)

FIG. 18

Syntax	Size	Type
Reftime_segment(){		
sync_byte	8	bslbf
segment_type	8	bslbf
segment_length	16	uimsbf
reftime_version_number	4	uimsbf
reserved	4	bslbf
number_of_reftime_targets	8	uimsbf
for (j = 0 ; j < number_of_reftime_targets ; j++) {		
segment_associate_id	8	uimsbf
reftime_hour	8	tcimsbf
reftime_minute	8	tcimsbf
reftime_second	8	tcimsbf
reftime_frame	8	tcimsbf
}		
}		

(a)

number_of_reftime_targets (8bits)	THE NUMBER OF TARGETS TO WHICH reftime IS SUPPLIED
segment_associate_id (8bits)	USED TO IDENTIFY MUTUALLY ASSOCIATED SEGMENTS
reftime_hour (8bits)	1 0 HOUR DESCRIBED IN DECIMAL
reftime_minute (8bits)	1 0 MINUTE DESCRIBED IN DECIMAL
reftime_second (8bits)	1 0 SECOND DESCRIBED IN DECIMAL
reftime_frame (8bits)	1 0 FRAME DESCRIBED IN DECIMAL

(b)

FIG. 19

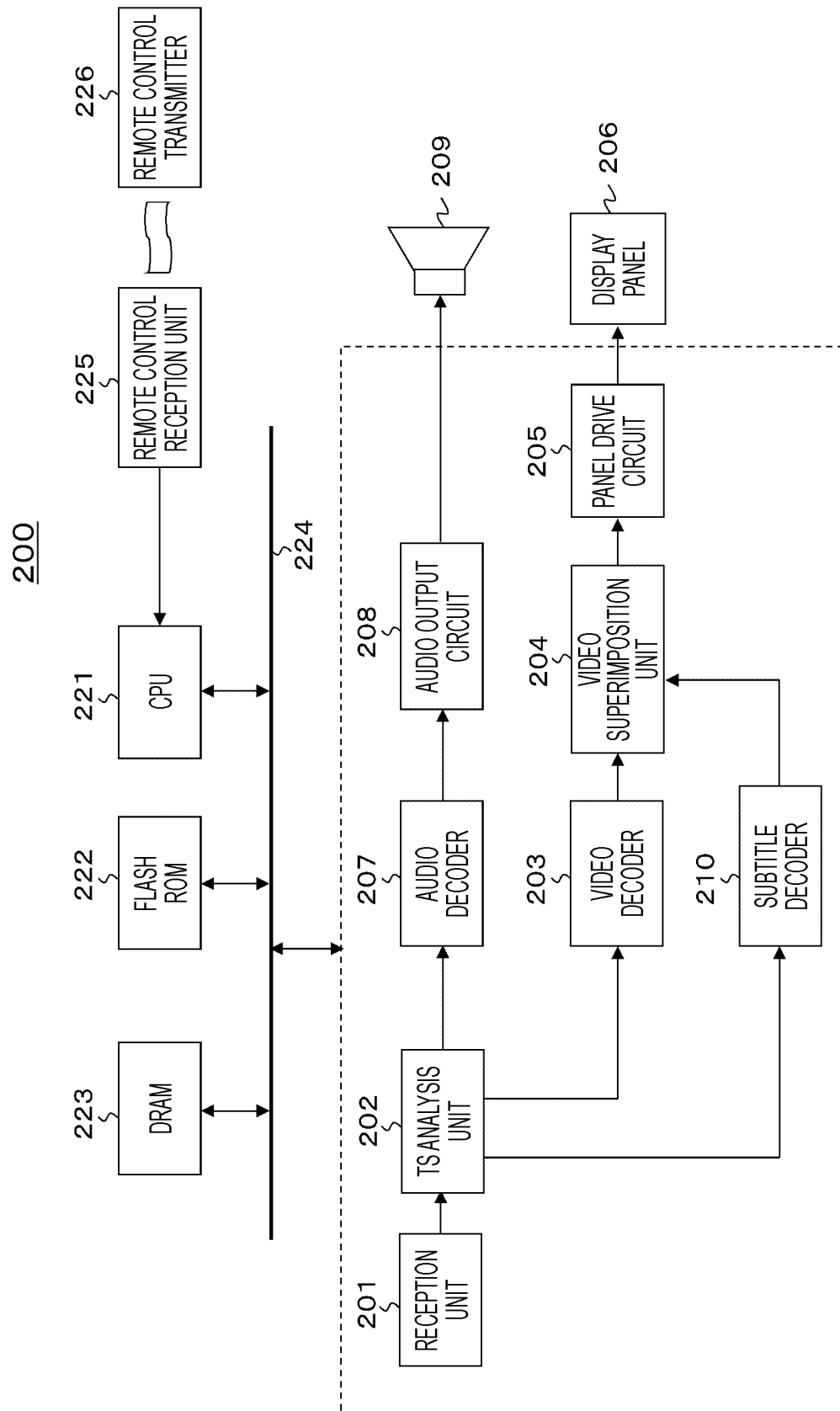


FIG. 20

