

# Video Frame Scheduler Plugin for Improving WebRTC Playback Quality

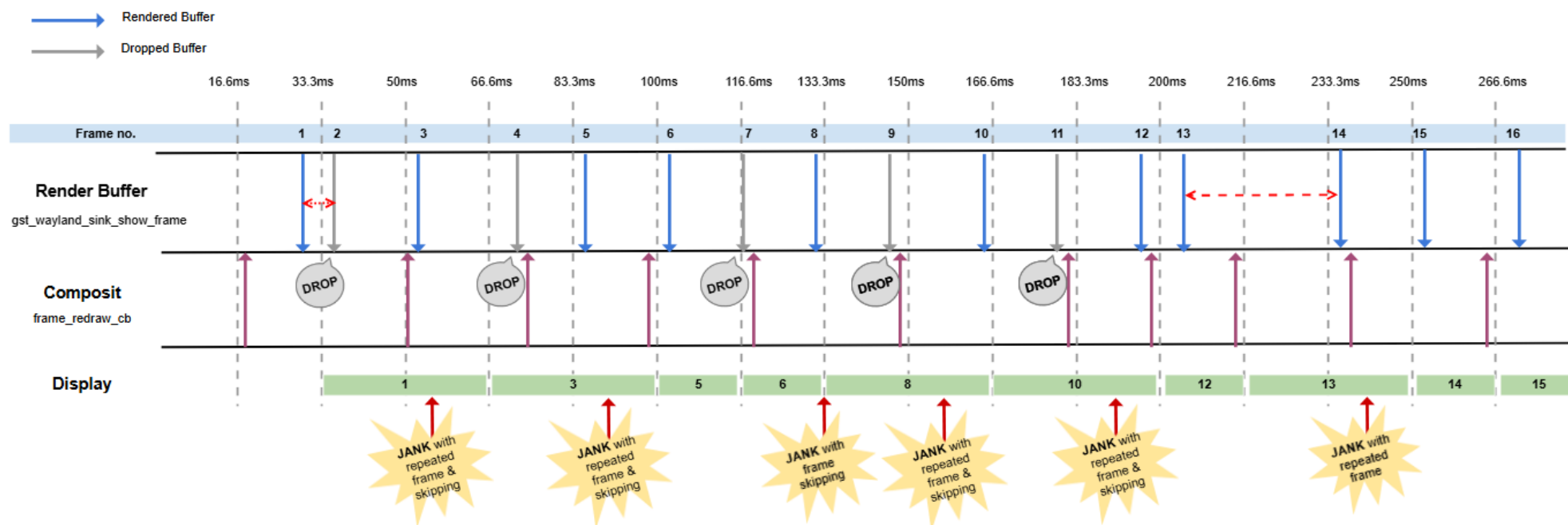
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# Challenges in WebRTC Playback Quality

## What causes frame drops?

- WebRTC frames are often delivered at **irregular intervals**.
- waylandsink commits frames only when it receives a **frame redraw callback** from the compositor.
- **Late callbacks cause frame drops** even when all frames are delivered to waylandsink.
- Over **35% frame drop** observed on our devices during 60fps **cloud gaming playback**.

## AS-IS

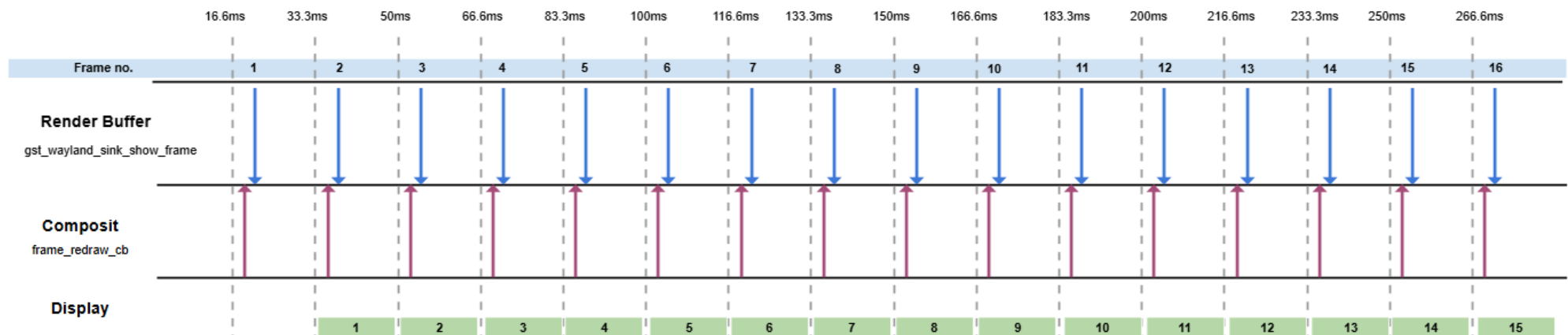


# Frame Interval Scheduling

## Why do we need frame interval scheduling?

- Non-WebRTC streaming provides **regular frame intervals**. → stable rendering
- To improve playback quality, frame intervals must be **scheduled consistently**.

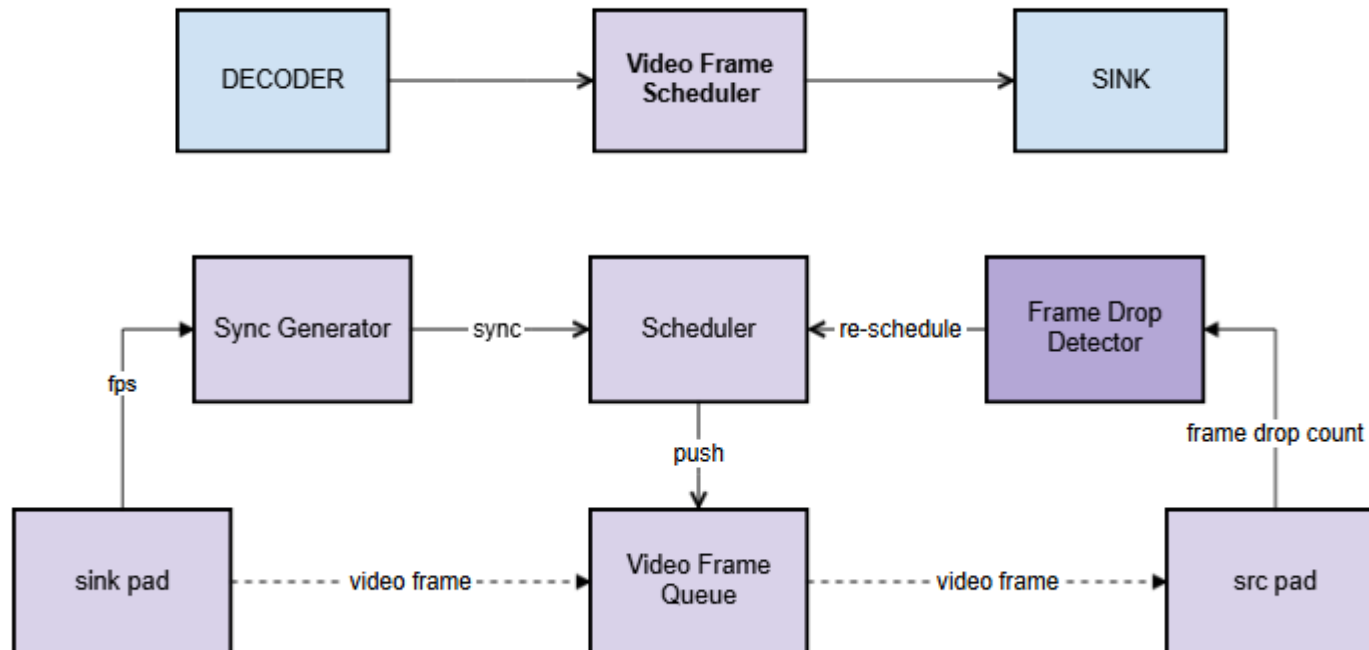
## TO-DO



# Video Frame Scheduler Plugin

## What is Video Frame Scheduler?

- It is a plugin that **manages video frames** to be displayed **at the right time**.
- It ensures **smooth playback** by minimizing frame drops and delays, preventing jank.
- A modular plugin that synchronizes frame delivery between decoder and sink.
- Sync events trigger frame delivery at consistent intervals.



# Unexpected Drop Pattern from Periodic Scheduling

## Issue

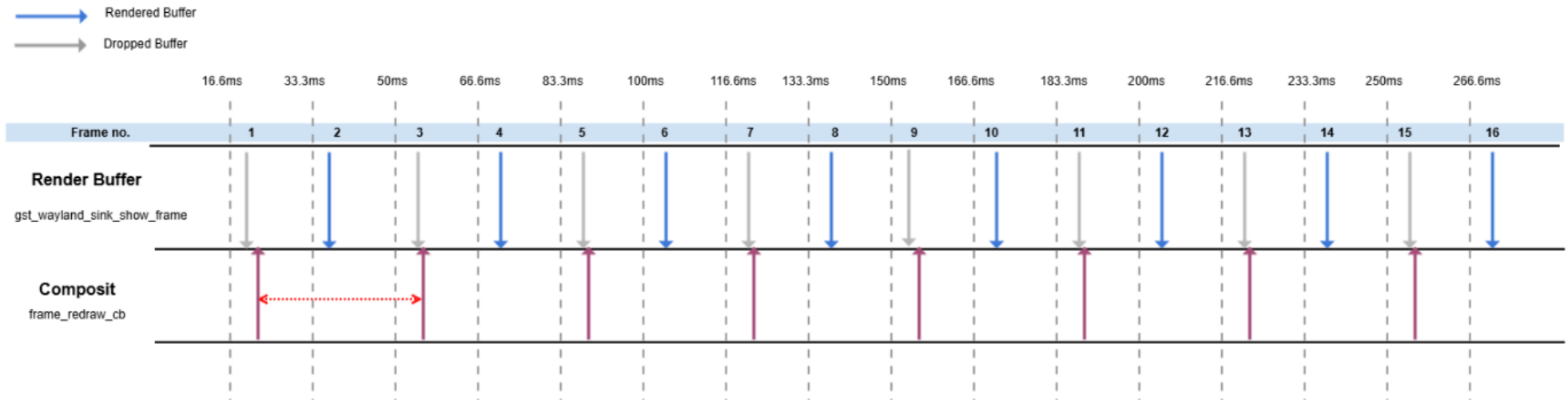
: Periodic scheduling caused unexpected frame drops, sometimes reaching 50%.

## Cause

: If a **callback arrives immediately after a frame drop**, the next frame is rendered 16.6 ms later, delaying the next callback to 33.3 ms. This mismatch locks the system into a **repeating drop pattern that persists once established**.

## Solution

: Introduced a **Frame Drop Detector** to dynamically reschedule rendering and **restore alignment**.



# Improvement & Next Steps

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## Improvement

- Frame drop rate reduced to **below 10%** through periodically rendering video frames .
- Stable frame delivery achieved even under timing mismatch conditions.

## Next Steps

- Shift from reactive drop handling to proactive scheduling.
- Use VSync time and period from the display to predict rendering time.
- Align video frame delivery with display refresh cycles.

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Thank you