

**Joint Video Experts Team (JVET)
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29/WG 11**

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Title: AHG18: Decoder side NN-based picture generation for lost picture substitution

Status: Input document to JVET

Purpose: Proposal

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Source: Huawei

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Abstract

This document describes an experiment of applying NNPF functionality for generation of lost pictures unavailable due to network transmission issues in ultra-low latency scenario, and proposes modifications to the AHG18 software to enable this functionality based on existing NNPF SEI mechanism. The proposed implementation is controlled via the NNPF interface and utilizes the additional syntax proposed in JVET-AP0226. The generated pictures can be used both for output to display, and for lost reference frames substitution controlled by specific flag. Being tested according to ULL CTC JVET-AN2039, this picture generation technique allows to reduce video freezes significantly, and noticeable improves subjective quality for short interval freeze substitution. At the same time long distance extrapolation remains challenging. The contribution provides a starting point for further investigation and improvement in various aspects of missed picture generation functionality.

Introduction

During CfE evaluation of proposal JVET-AN0080 “AHG18: CfE response in additional functionality on ultra-low latency and packet loss resilience” conducted at 40th JVET meeting it has been noted that frequent and long freeze events significantly affects subjective perception. Therefore, technology that can mitigate freeze artifacts and protect continuous decoding process even under really poor network channel would improve visual quality a lot. To address this aspect the experiments utilizing NNPF have been conducted.

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CARD

<http://vexpertise.stbit.ru/documents/JVET-AP0222>



https://jvet-experts.org/doc_end_user/current_document.php?id=16886



https://jvet-experts.org/doc_end_user/documents/42_SantaEularia/wg11/JVET-AP0222-v2.zip



http://vexpertise.stbit.ru/meeting-notes/source/meeting_42_ap



MEETING NOTES

[JVET-AP0222](#) AHG18: Decoder side NN-based picture generation for lost picture substitution [K. Malyshev, M. Sychev, S. Ikonin, E. Alshina (Huawei)]

This document describes an experiment of applying NNFP functionality for generation of lost pictures unavailable due to network transmission issues in ultra-low latency scenario, and proposes modifications to the AHG18 software to enable this functionality based on existing NNPF SEI mechanism. The proposed implementation is controlled via the NNPF interface and utilizes the additional syntax proposed in JVET-AP0226. The generated pictures can be used both for output to display, and for lost reference frames substitution controlled by specific flag. Being tested according to ULL CTC JVET-AN2039, this picture generation technique allows to reduce video freezes significantly, and noticeable improves subjective quality for short interval freeze substitution. At the same time long distance extrapolation remains challenging. The contribution provides a starting point for further investigation and improvement in various aspects of missed picture generation functionality.

Complexity? Not precisely described, run on GPU.

It was asked if also other information related to the lost picture (beyond reconstructed pixels) would be generated? No

Same basic architecture as for the error-correcting loop filter proposed before, also presented in CfE. Kind of non-normative version of it.

Agreed to be included in AHG software (same branch as for loop filter).

CITATION

K. Malyshev, M. Sychev, S. Ikonin, E. Alshina, "AHG18: Decoder side NN-based picture generation for lost picture substitution", JVET-AP0222, 42nd Meeting: Santa Eulària, ES, April 2026.