A Proposal of Burst Cloning for Video Quality Improvement in Optical Burst Switching Networks

Felix Espina, Daniel Morato, Mikel Izal and Eduardo Magaña
Public University of Navarre
felix.espina@unavarra.es

Burst Cloning Proposal

Frame Duplication at Next Burst: FDNB
Duplicates the priority frames into the next burst

Frame Duplication at Exclusive Burst: FDEB
Duplicates the priority frames creating an independent burst

Video quality measurement: VT\text{nd}
User perceives time periods when video is not correctly decoded

VT\text{nd}: Number of seconds over one hour that the video could not be displayed, i.e., is not correctly decoded

Q: Decodable Frame Rate = function(Frame Loss Probability, GoP)
VT\text{nd} = (1-Q)\times 3600

Priority Frames Selection based on GoP

\[ \delta = VT\text{nd}[\text{cloning I-frames}] - VT\text{nd}[\text{cloning P-frames}] \]

- P-frames when \( \delta < 0 \)
- I-frames when \( \delta > 0 \)

GoPs with one P-frame: best priority frames always I-frames
GoPs with two P-frames: best priority frames usually P-frames

Conclusions

Novel video quality improvement cloning schemes for OBS
Significant quality improvement with virtually no trade-offs
Selection of frames to clone has strong dependence on GoP

Next works

Analytical model for any T\text{out}
Full network validation (NSFNet)

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