ITU Kaleidoscope 2015

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Adaptive Video Streaming Over HTTP Through 3G/4G Wireless Network Employing Dynamic On The Fly Bit Rate Analysis

Dhananjay Kumar

Department of Information Technology

Anna University

MIT Campus, Chromepet, Chennai

dhananjay@annauniv.edu

Barcelona, Spain

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Outlines

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- Quality Observations
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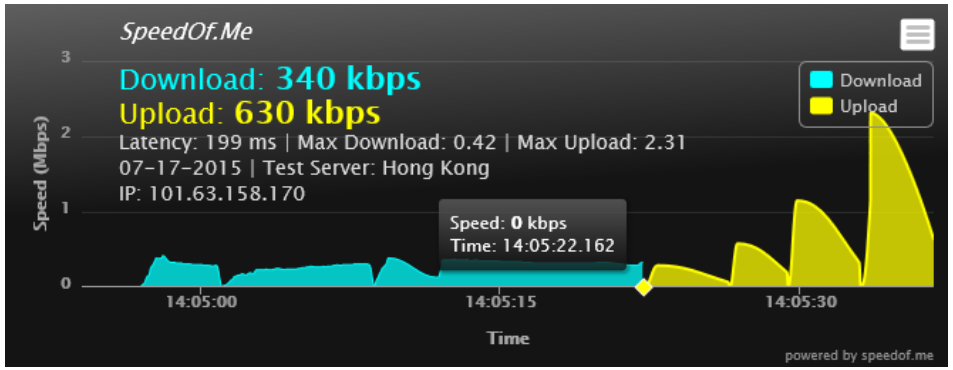
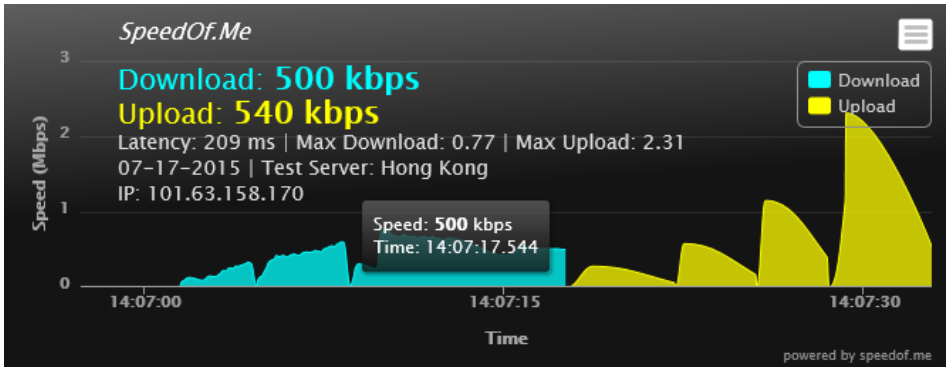
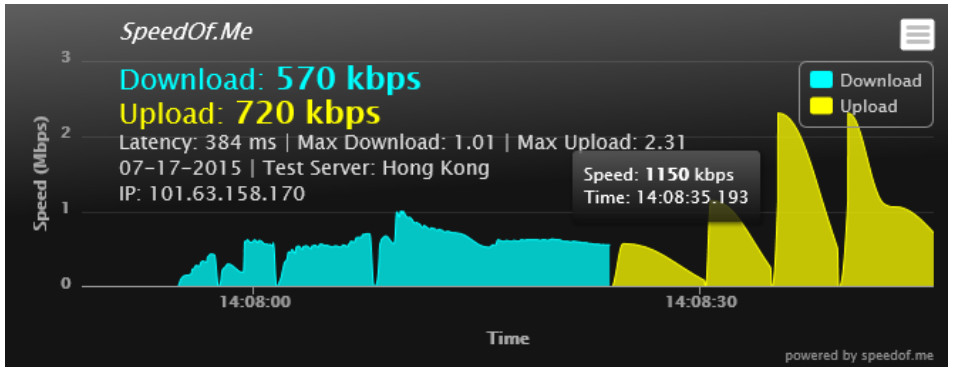
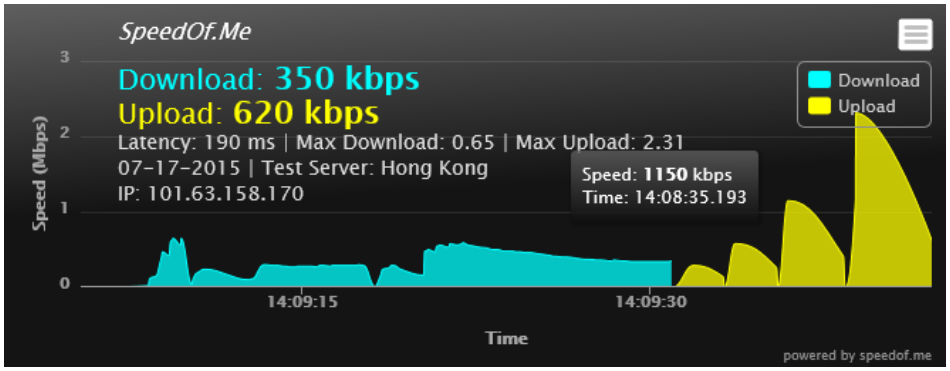
  - SSIM Measurements
- Some Selected Frame
  - Live Video Stream
  - Stored Video Stream
- Conclusion and Scope for Future Works

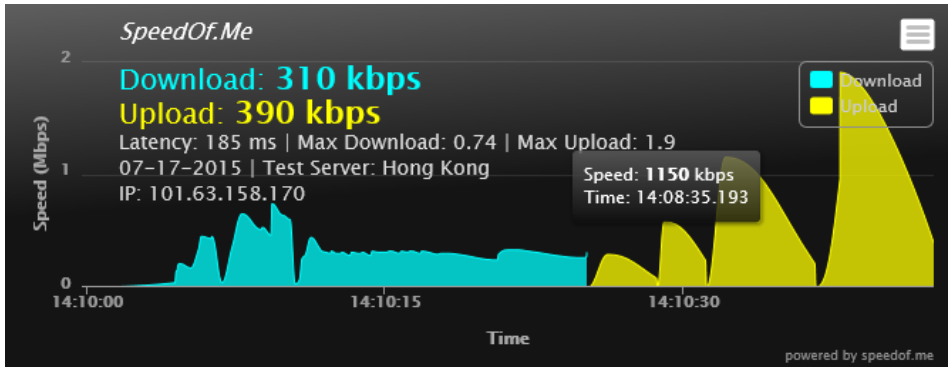
Case Study











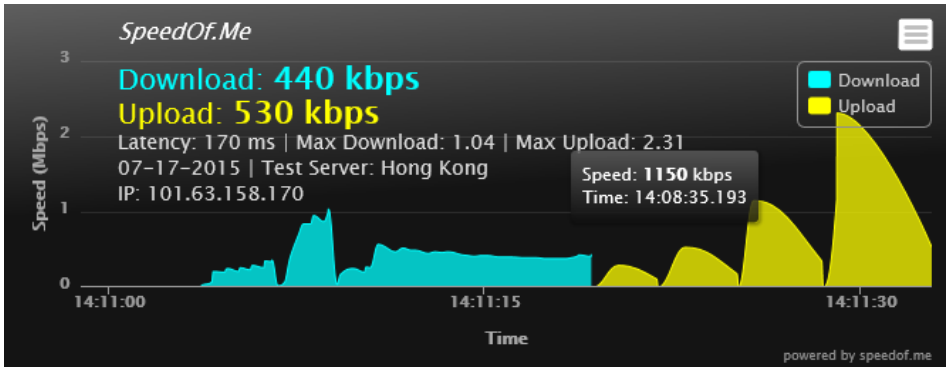


Fig.1: Data Rate Observed on a *Reliance Netconnect+* (CDMA 1xEVDO Rev-A) 3G Dongle

System Model

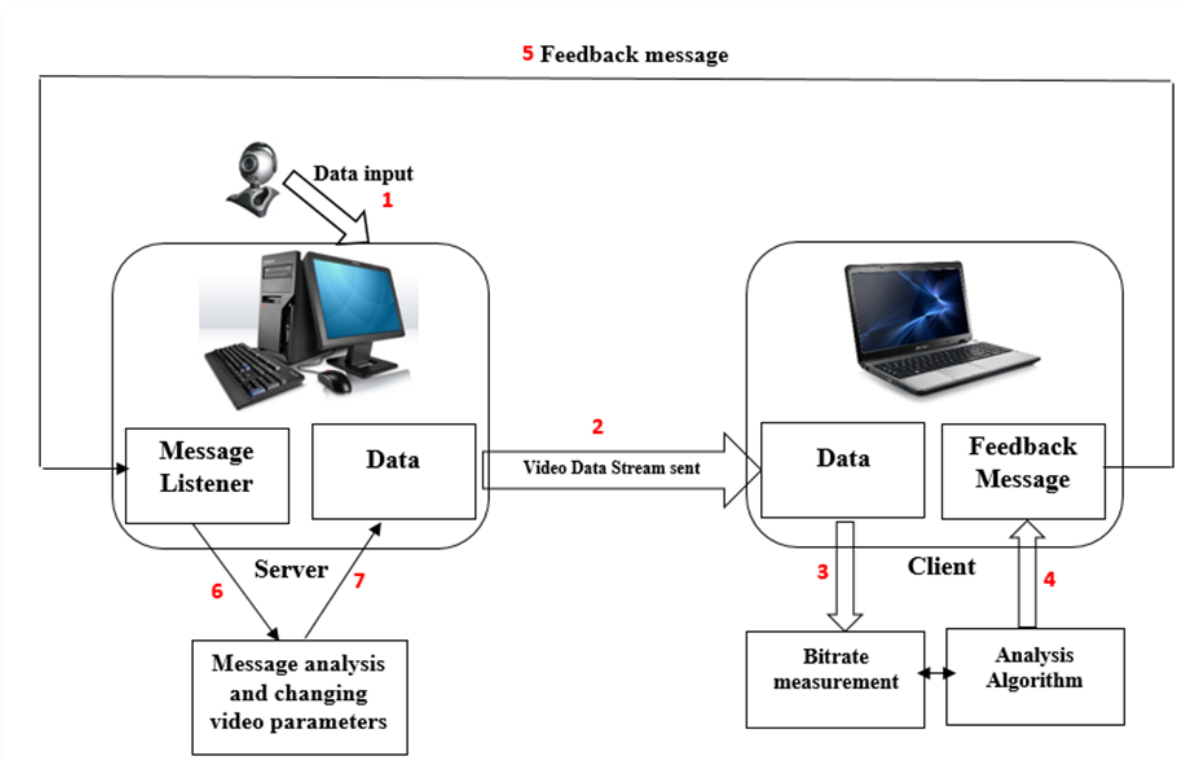


Fig.2: The schematic of an Adaptive video streaming

System Parameters

Table 1. Test Factors as per the ITU-T J.247

S. No	Parameters	Values
1	Transmission	Errors with packet loss
2	Frame rate	5 fps to 30 fps
3	Video Codec	H.264/AVC (MPEG-4 part 10), VC-1, Windows Media 9, Real Video (RV 10), MPEG-4 Part 2
4	Video Resolution: QCIF, CIF, and VGA	QCIF: 16 - 320 Kbps CIF: 64 - 2000 Kbps VGA: 128 - 4000 Kbps
5	Temporal errors (pausing with skipping)	Maximum of 2 seconds

Server Side Modules

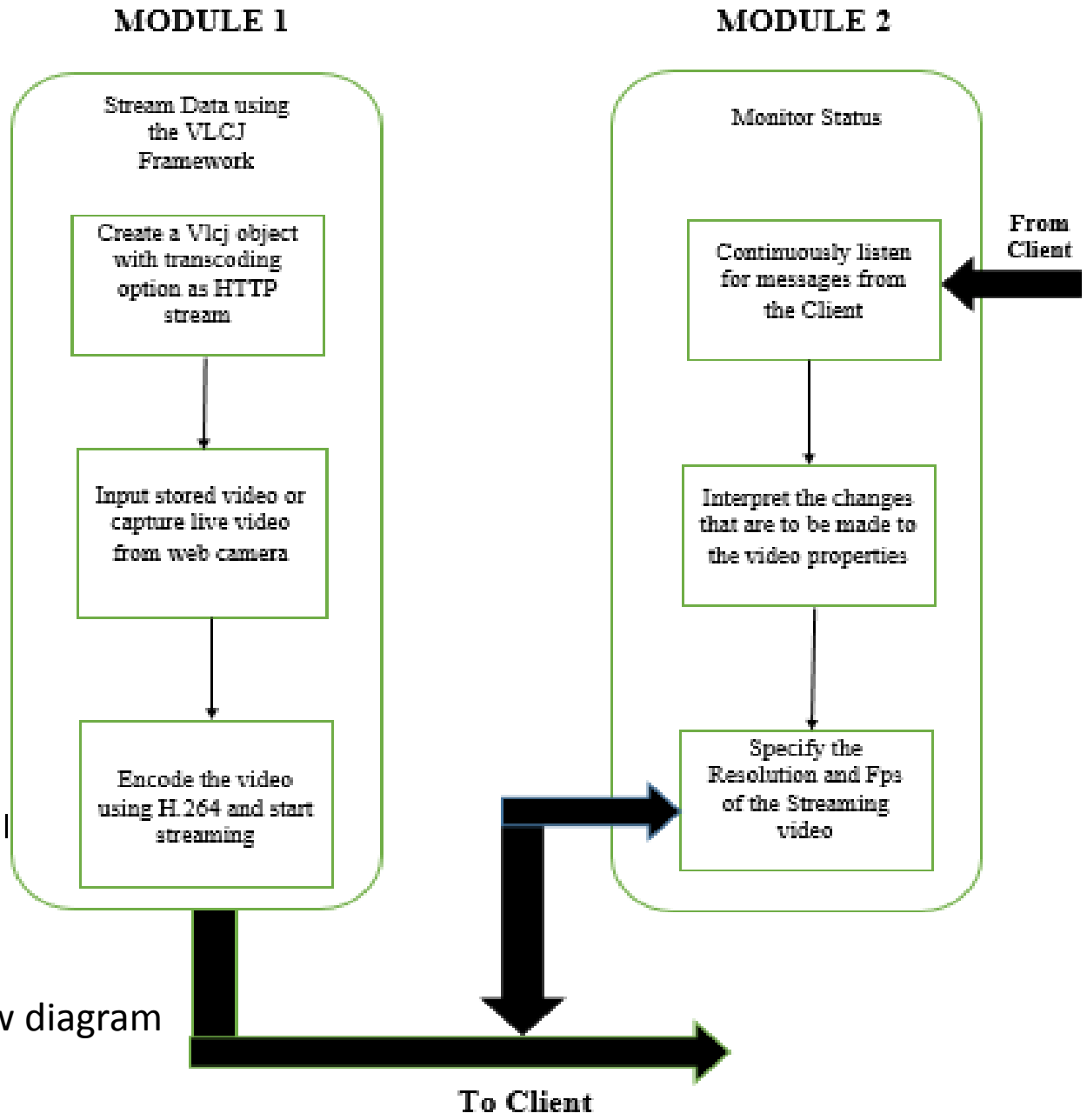


Fig.3: Server side modular flow diagram

Client Side Modules

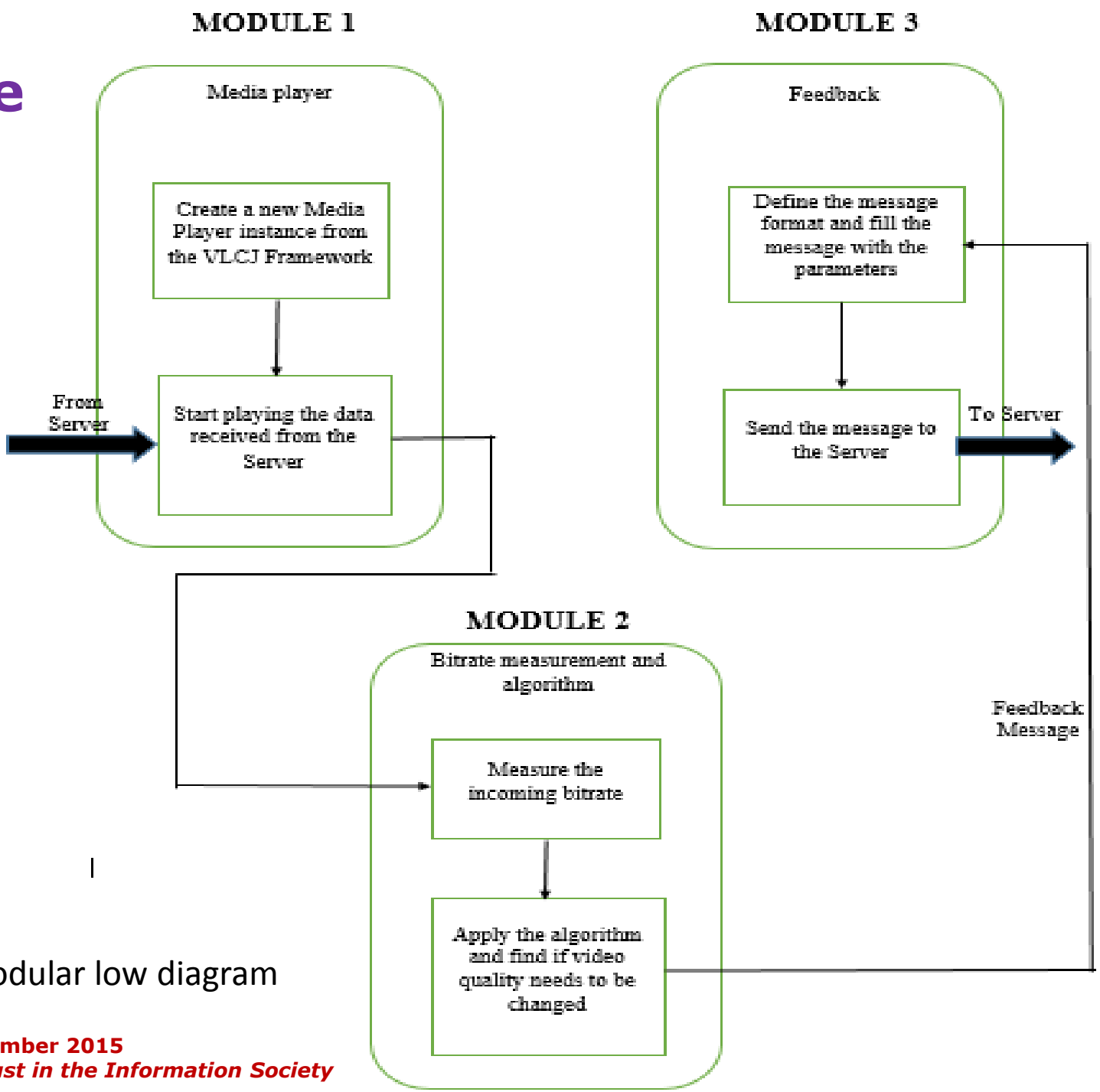


Fig.4: Client side modular low diagram

Bitrate Pattern Estimation

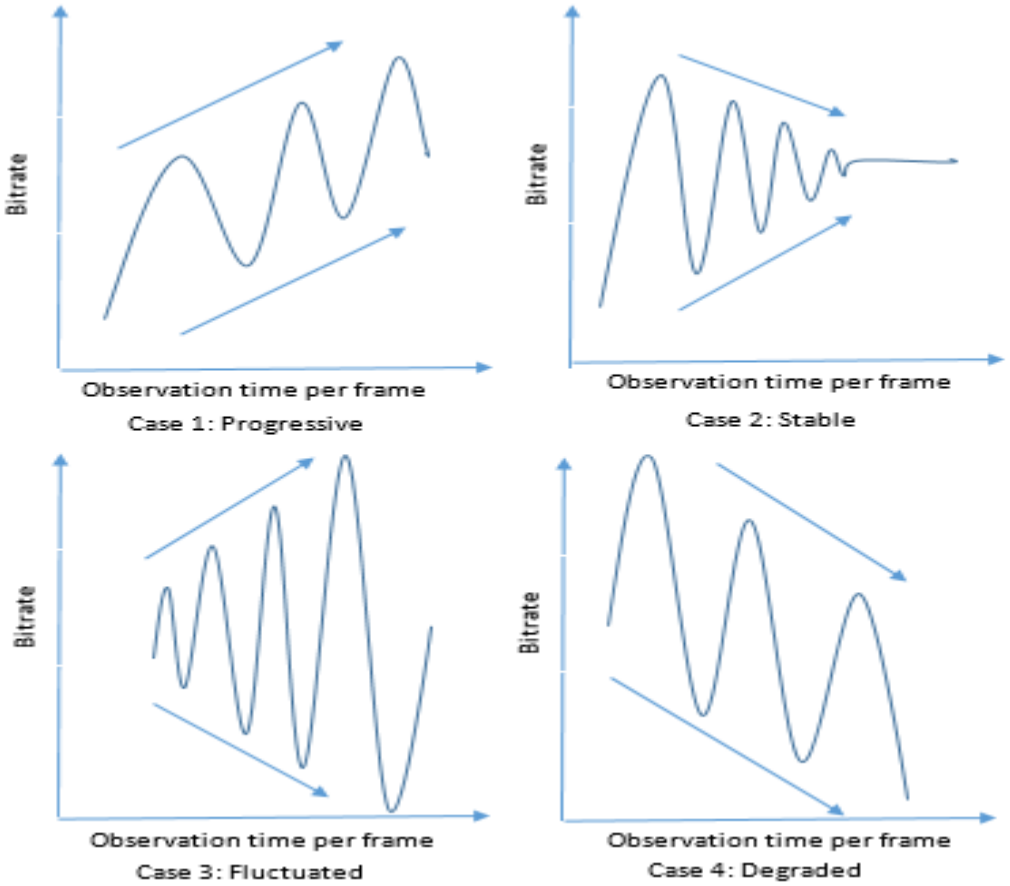


Fig.5: Different bitrate patterns

PSNR Measurements

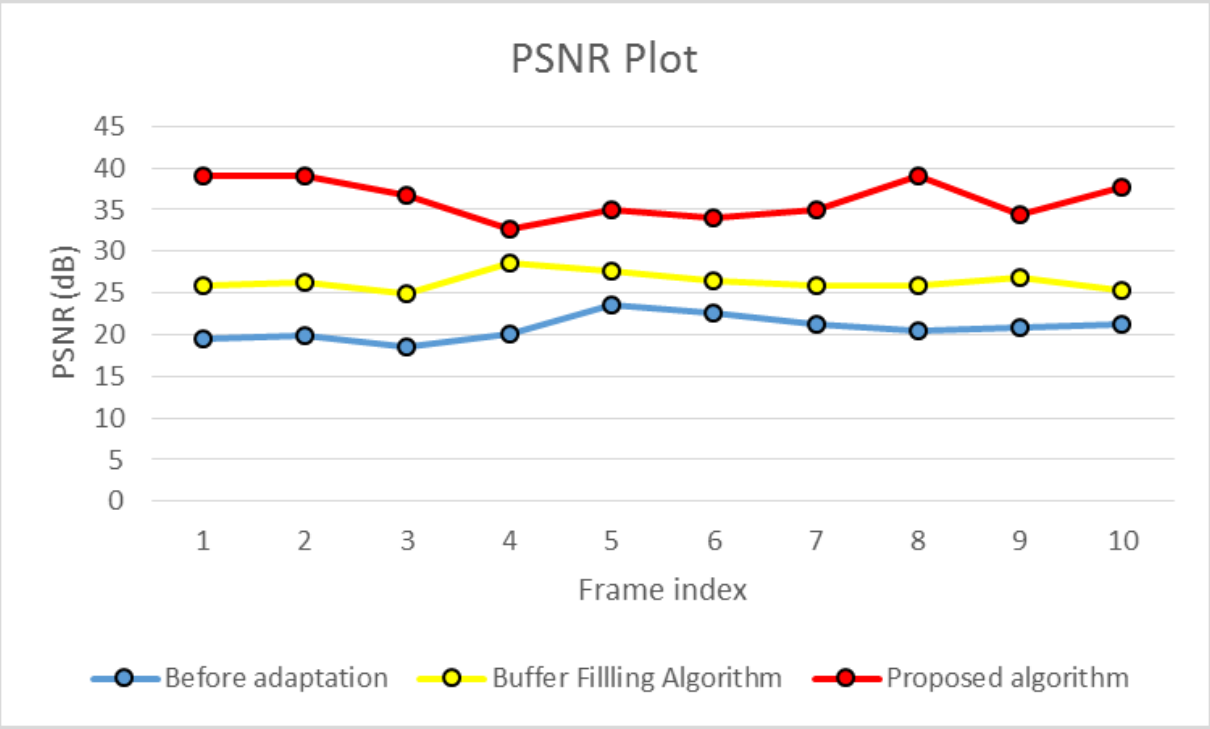


Fig.6: Observed Peak Signal to Noise Ratio (PSNR)

SSIM Measurements

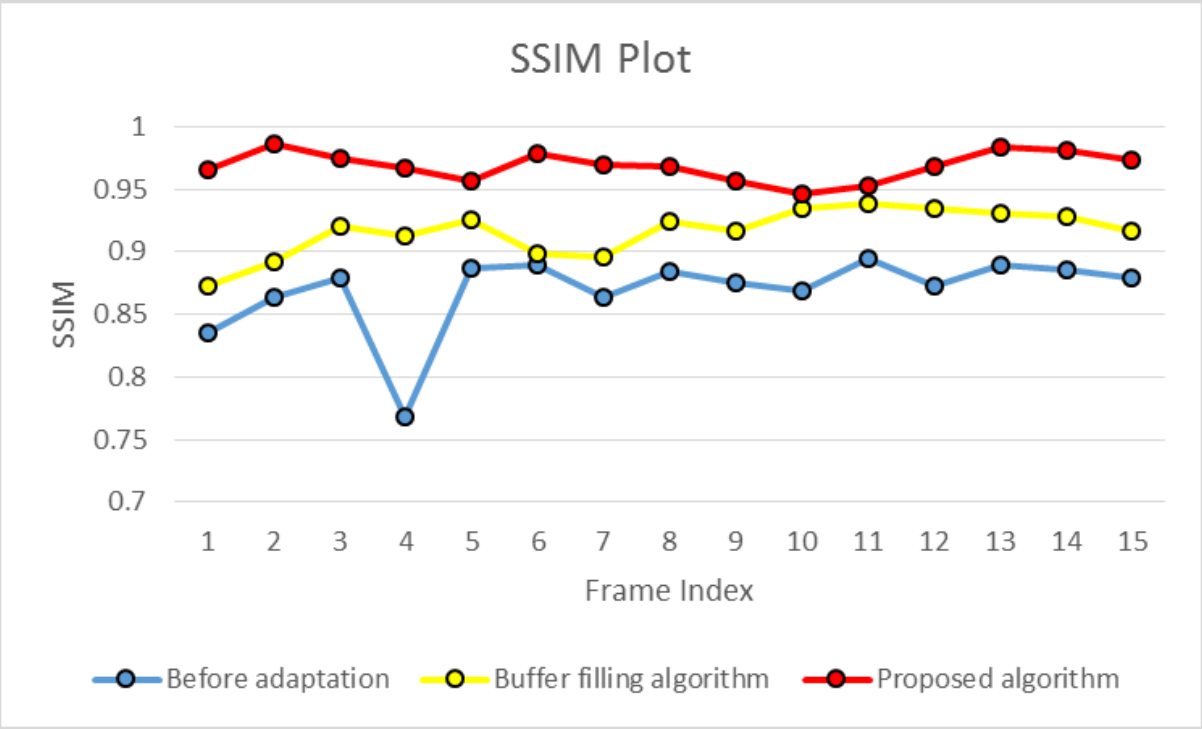


Fig.7: Observed structural similarity (SSIM) index

Some Selected Frame From Live Video Stream

Fig.8: Some selected frame from live video stream: Original (above) and Decoded (below)

Some Selected Frame From Stored Video Stream

Fig.9: Some selected frame from 'Foreman' video stream: Original (above) and Decoded (below)

Conclusion and Future Scope

- The prototype system in client-server architecture
- Supports live as well stored video streaming
- The system performance observed through full-reference metrics i.e., PSNR and SSIM
- Support for quality of experience
- No change in underlying network layers or hardware

- Multicast will require additional efficient mechanism
- Scalability need to be studied
- Study of effect of a sudden network congestion need
- Implementation on cellular wireless network based hand-held devices

Acknowledgements

1. Anna University, Chennai

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