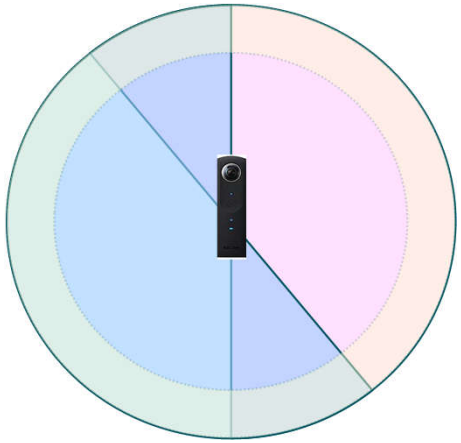
If you use these sequence traces please cite:
S. Colonnese, F. Cuomo, L. Ferranti, T. Melodia , "Efficient video streaming of 360◦cameras in Unmanned Aerial Vehicles: an analysis of real video sources", IEEE/Eurasip 7th European International Workshop on Visual Image Processing (EUVIP 2018), 26-28 November 2018, Tampere, Finland.

360 degrees Video Dataset Acquisition

- We have acquired L = 11 video sequences using a Ricoh Theta S Camera
  - two fish eye lenses whose field of views are slightly overlapping.



Video Dataset Acquisition

- Shooting in different environments and lighting conditions
  - Indoor,
  - Outdoor
- Different camera speeds
  - 5 km/h (Pedestrian),
  - 20 km/h (Drone)
- Spatial and Temporal resolution, Temporal Duration
  - 1920x1080, 30 fps, about 2k frames (one minute)

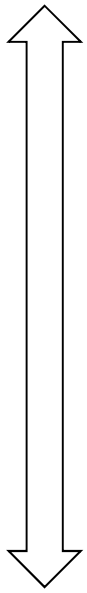
Video encoding

- Encoding:
  - suited to be implemented on-board
  - no on-board stitching
  - H.264 video encoding (ffmpeg)
- Input of the encoder
  - Ricoh Theta output video sequence
  - Stitching free
  - Pre-encoded at a rate much higher than the final targeted video rate
- Fish eye lenses present challenges of motion compensation schemes

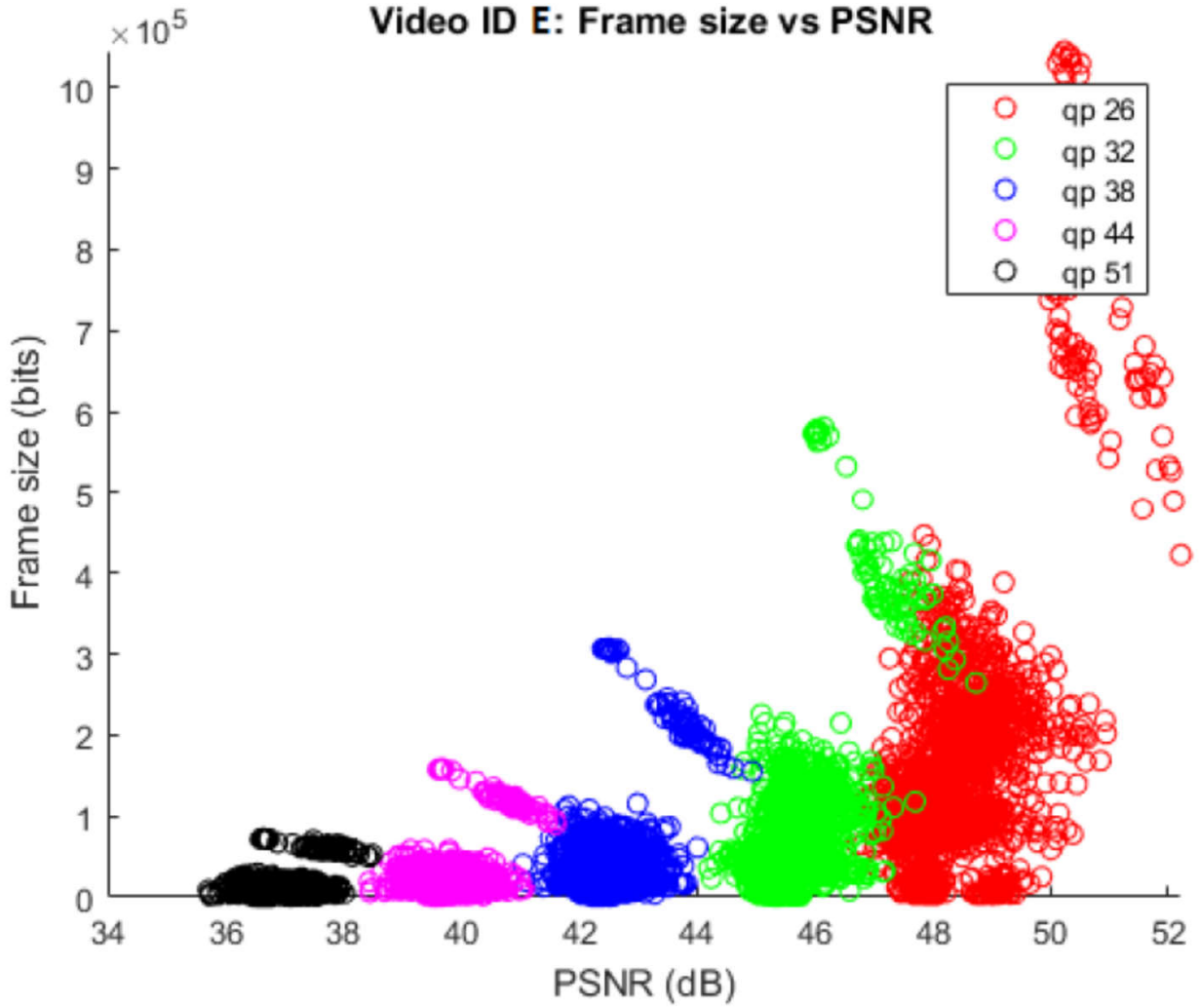
Frame level Rate vs PSNR analysis

- Intra, Predicted, Bi-directionally predicted

30 Mbps

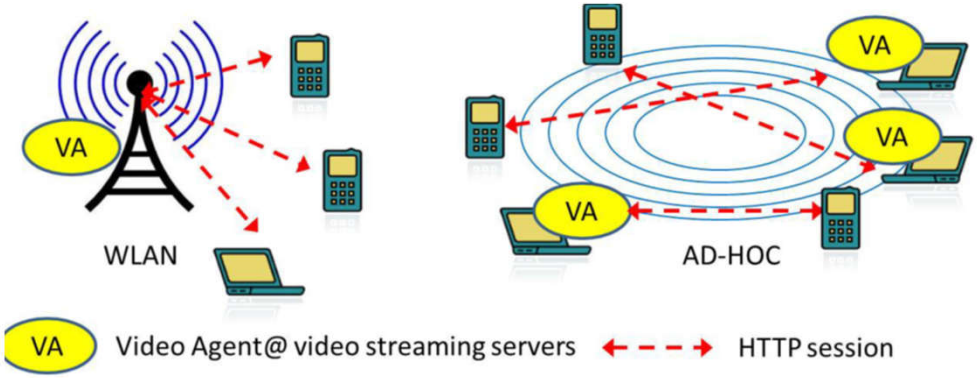


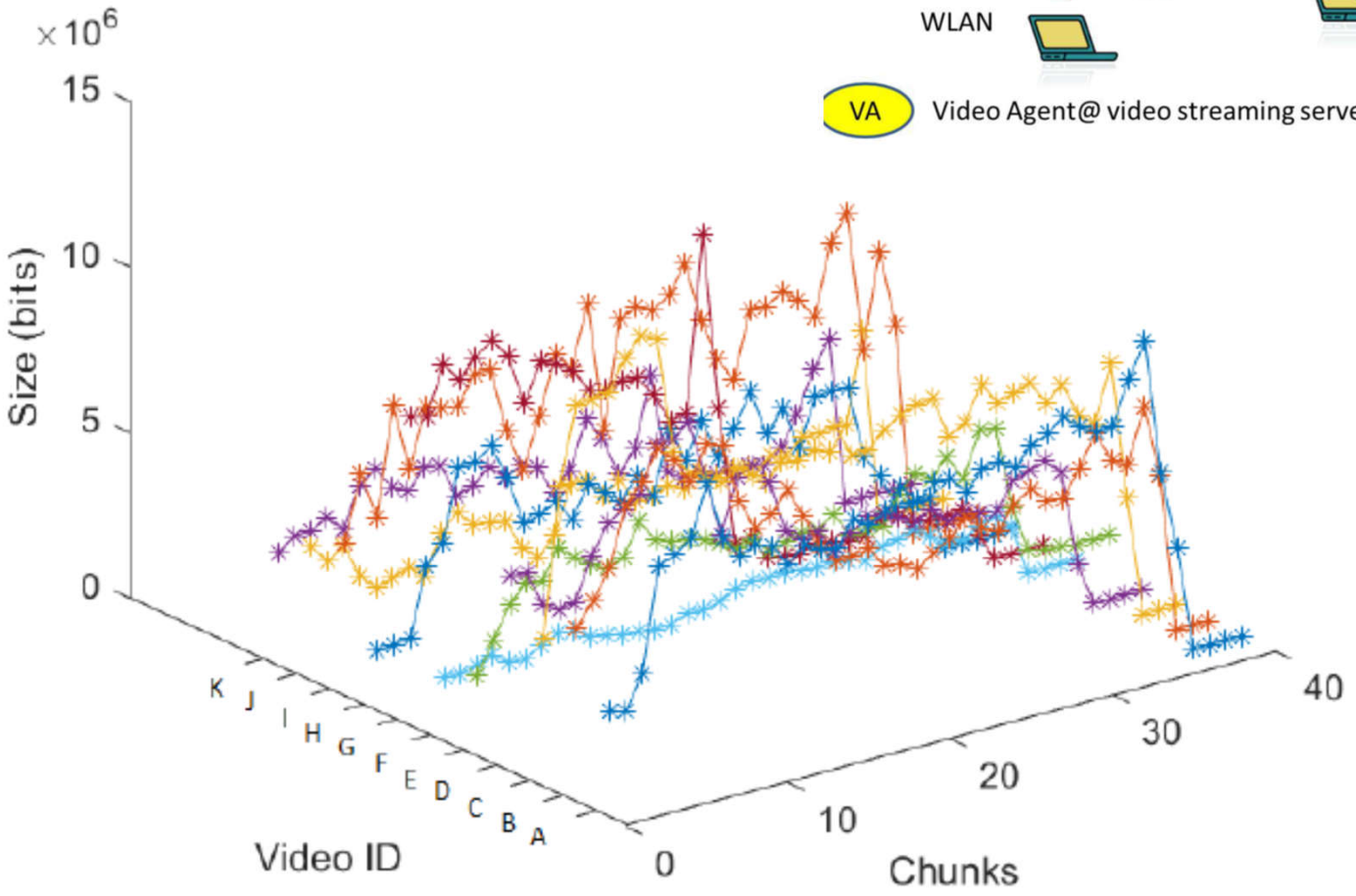
3 Mbps



A streaming oriented relevant metric: the chunk size

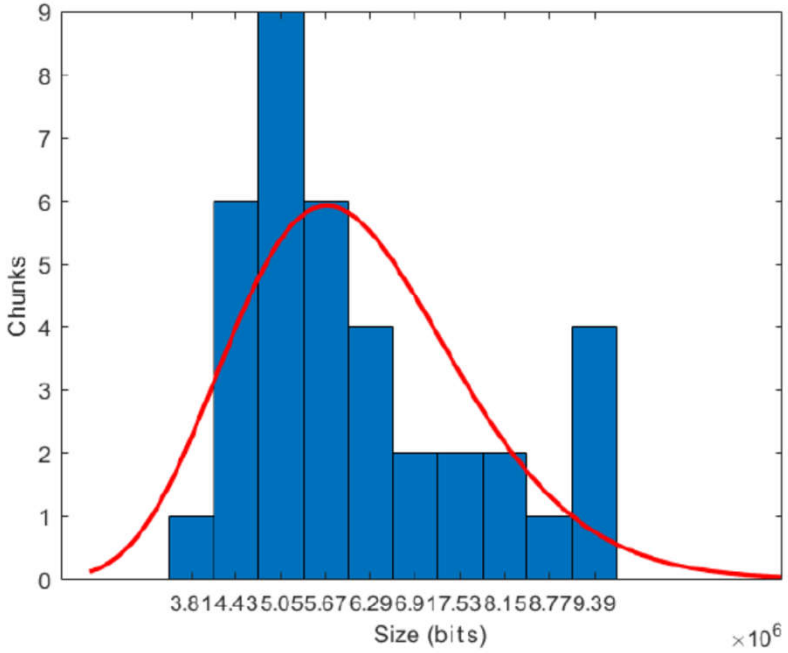
- Fixed duration, variable size video packet



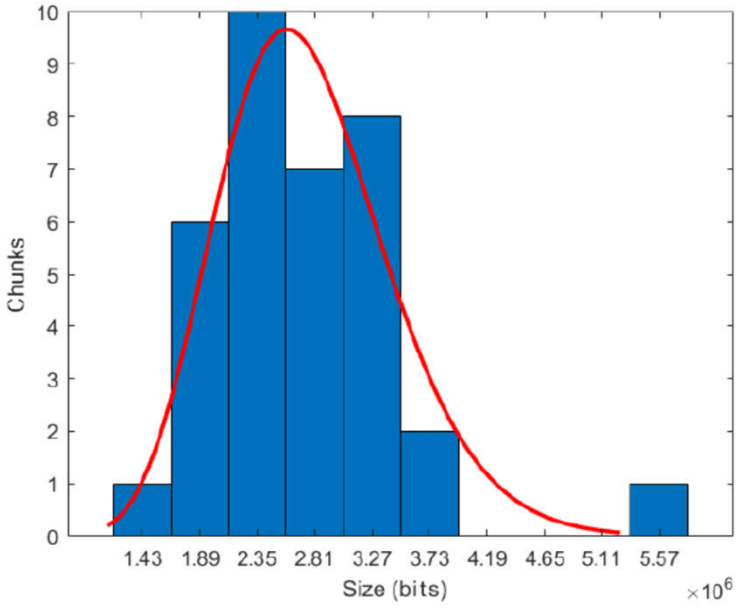


Chink size pdf: still a heavy tail distribution

$$p_{\Lambda}(\lambda;\mu_q,\sigma_q^2) = C_q \cdot \lambda^{(\mu_q^2/\sigma_q^2-1)} \cdot e^{-(\mu_q/\sigma_q^2)\lambda} \cdot u_{-1}(\lambda)$$



$$C_q = \left(\mu_q/\sigma_q^2\right)^{\mu_q^2/\sigma_q^2} / \Gamma\left(\mu_q^2/\sigma_q^2\right)$$



Traffic traces fitting

- Gamma distribution of the chunksize

GAMMA α, β FOR PH-CAMERA SEQUENCES

Gamma α, β / ID	*A*	*B*	*C*	*D*	*E*	*F*	*G*
$QP = 26$	15.75, 867408	21.57, 606697	24.52, 648663	9.06, 1119615	6.29, 1277376	21.87, 165399	25.64, 4291332
$QP = 32$	12.29, 526355	14.71, 414464	18.84, 429793	7.78, 637759	6.22, 601519	21.26 , 79634	2.19 , 2566866
$QP = 38$	11.71, 269005	16.06, 181641	22.18, 177467	8.26, 296006	6.96, 266984	21.5, 41572	2.22, 1191324
$QP = 44$	12.21, 140059	20.66, 73889	26.58, 78420	9.97, 128950	6.95, 144286	20.58, 23554	2.27, 568646
$QP = 51$	12.13, 73850	25.65, 29547	26.48, 40149	11.25, 56930	6.55, 78189	19.07, 12805	2.14 , 276502

GAMMA α, β FOR DM-CAMERA SEQUENCES

Gamma α, β / ID	*H*	*I*	*J*	*K*
$QP = 26$	6.47, 1479464	46.09.57 340199	20.02 320345	17.98 432167
$QP = 32$	5.86 , 738199	24.36 , 309909	16.30 , 168959	11.20 , 303144
$QP = 38$	6.20 , 339875	21.54 , 168698	183.9 , 71297	10.76 , 146274
$QP = 44$	5.81 , 189433	24.57 , 75901	18.20 , 32668	9.72 , 72869
$QP = 51$	5.42 , 101003	27.25 , 3.3902	21.54 , 9985	9.83 , 26152

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