Quality of VVoIP applications in wireless networks

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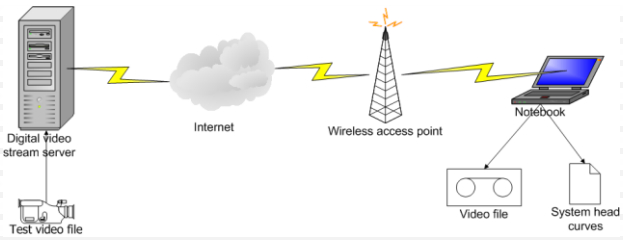
Experiment scheme



Mathematical model

$$Q_{mos} = Q_{ideal} - \alpha p - \beta j$$

- Q_{ideal} – maximum video quality for the codec, the scores of one to five
- p – packet loss percent, %
- j – variation of interpacket delay (jitter) at the time of error, ms.
- Q_{mos} – video quality at the receiving side, points from zero to five
- α, β – Coefficients of the model, which can be found experimentally

Coefficients of the model

VALUES OF COEFFICIENTS OF THE MODEL FOR CODECS MPEG-2, DIVX IN WIFI NETWORKS

№	Codec	Q_{ideal}	α^k	β^k	α^w	β^w
1	MPEG-2	4,2±0,2	0,15±0,03	0,011±0,002	0,04±0,01	0,003±0,001
2	MPEG-4	4,7±0,2	0,27±0,05	0,013±0,003	0,13±0,02	0,01±0,002

VALUES OF COEFFICIENTS OF THE MODEL FOR CODECS MPEG-2, DIVX IN 3G NETWORKS

№	Codec	Q_{ideal}	α^k	β^k	α^w	β^w
1	MPEG-2	4,2±0,2	0,15±0,03	0,011±0,002	0,04±0,01	0,003±0,001
2	MPEG-4	4,7±0,2	0,27±0,05	0,013±0,003	0,13±0,02	0,01±0,002

α^k, β^k – coefficients of the model with losses of packets on I-frames

α^w, β^w – coefficients for the intact I-frames

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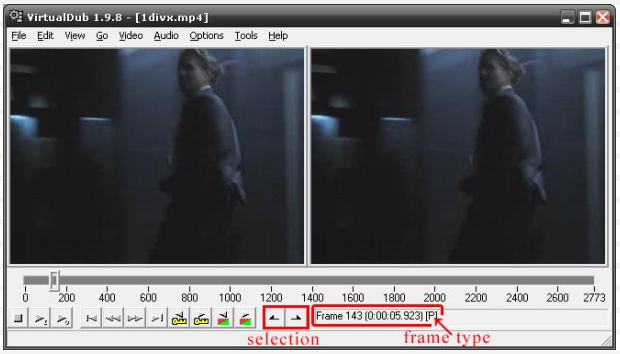
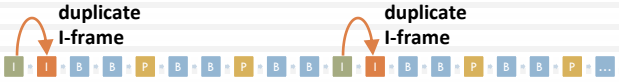
Search of distortion frames



Frames in the video stream

Example of the standard RTP stream (VVoIP)

Example of the modified RTP stream (VVoIP)



I – intra-coded frames

- **Bears in itself the full information** on the video image and it can be restored without reinforcement with the additional data
- In the stream is **~7%**

P – predictive-coded frames

B – bidirectionally-predictive-coded frames

- **Codes difference** between the previous and current frames
- In the stream is **~93%**

Conclusions

For substantial increase of video quality by transmission to a wireless network it is necessary to fulfill three mandatory items on upgrade of the circuit of link:

1. The server of stream video should duplicate the packets containing the information of I-frames
2. To upgrade a video player on the receiving side automatically to throw back duplicated RTP packets
3. The period between I-frames cannot exceed 2 seconds (optimally 1 second)