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Resistance Distortion Direction for the Passage of Video in the Context of Multihop Wireless Networks

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ABSTRACT—Traditional routing metrics designed for wireless networks are application-agnostic. In this paper, we consider a wireless network where the application flows consist of video traffic. From a user perspective, reducing the level of video distortion is critical. We ask the question “Should the routing policies change if the end-to-end video distortion is to be minimized?” Popular link-quality-based routing metrics (such as ETX) do not account for dependence (in terms of congestion) across the links of a path; as a result, they can cause video flows to converge onto a few paths and, thus, cause high video distortion.

1.INTRODUCTION

What is networking? Networking is the word basically relating to computers and their connectivity. It is very often used in the world of computers and their use in different connections. The term networking implies the link between two or more computers and their devices, with the vital purpose of sharing the data stored in the computers, with each other. The networks between the computing devices are very common these days due to the launch of various hardware and computer software which aid in making the activity much more convenient to build and use.

2.RELATED WORK

The plethora of recommendations from the standardization bodies regarding the encoding and transmission of video indicates the significance of video communications. Different approaches exist in handling such an encoding and transmission. The Multiple Description Coding (MDC) technique fragments the initial video clip into a number of substreams called descriptions. The descriptions are transmitted on the network over disjoint paths. These descriptions are equivalent in the sense that any one of them

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is sufficient for the decoding process to be successful, however the quality improves with the number of decoded substreams. Layered Coding (LC) produces a base layer and multiple enhancement layers. The enhancement layers serve only to refine the base-layer quality and are not useful on their own. Therefore, the base layer represents the most critical part of the encoded signal [5], [6]. In this paper, we focus on the layered coding due to its popularity in applications and adoption in standards. Standards like the MPEG-4 [1] and the H.264/AVC [2] provide guidelines on how a video clip should be encoded for a transmission over a communication system based on layered coding. Typically, the initial video clip is separated into a sequence of frames of different importance with respect to quality and, hence, different levels of encoding. The frames are called I-, P-, and B-frames, and groups of such frames constitute a structure named the GOP. In each such GOP, the first frame is an I-frame that can be decoded independently of any other information carried within the same GOP. After the I-frame, a sequence of P- and possibly B-frames follows. The P- and B-frames use the I-frame as a reference to encode information. However, note that the P-frames can also be used as references for other frames. There has been a body of work on packet-loss-resilient video coding in the signal processing research community [7].

In [4], the video stream is split into high- and low-priority partitions, and FEC is used to protect the high-priority data. To account for temporal and spatial error propagation due to

quantization and packet losses, an algorithm is proposed in [8]

to produce estimates of the overall video distortion that can be used for switching between inter- and intracoding modes mper macroblock, achieving higher PSNR. In [9], an enhancement to the transmission robustness of the coded bitstream is achieved through the introduction of inter/intracoding with redundant macroblocks. The coding parameters are determined by a rate-distortion optimization scheme. These schemes are evaluated using simulation where the effect of the network

transmission is represented by a constant packet-loss rate, and therefore fails to capture the idiosyncrasies of real-world systems.

3.PROTOCOL DESIGN

To compute the solution to the MDR problem described in Section , knowledge of the complete network (the nodes that are present in the network and the quality of the links between these nodes) is necessary. However, because of the dynamic nature and distributed operations of a network, such complete knowledge of the global state is not always available to the nodes. In practice, the solution to the MDR problem can be computed by the source node based on partial information regarding the global state that it gathers. The source node has to sample the network during a path discovery process in order to collect information regarding the state of the network.

The sampling process includes the estimation of the ETX metric [3] for each wireless link in the network. These estimates provide a measure of the quality of the links. The estimation process can be implemented by tracking the successful broadcasting of probe messages in periodic time intervals. The ETX estimates computed locally in the neighborhood of a node are then appended in the Route Request messages during the *Route Discovery* phase. Upon reception of this message by the destination, a Route Reply message is sent back to the source that contains the computed ETX estimates, which are usable to compute .

The source node then can solve the optimization problem by using the information gathered via the sampling process described above. Specifically, upon receiving the Route Reply messages, the source node follows the steps presented in Algorithm 1. It defines the initial state of the optimization problem as , where is the GOP size. It defines the boundary setB that serves as the terminating set for the optimization process. Next, a call to Algorithm 2 produces the next node in the path. Because of the stochastic nature of

the second component of the state, its next value has to be estimated. The estimation is based on the transition probabilities given by (19)–(21). In particular, the estimated value is the expected value of the second component given its current value

Algorithm 1: Path discovery (Uses Algorithm 2)

Input: source node , destination node

Input: frame size

Output: route from to

1: /* DSR *Route Discovery* Phase */

2: **send**

3: **receive** messages

4: N node-ids from messages

5:

6: /*Path Discovery Initialization Phase*/

7:

8:

9: B

10:

11:

12: **append** to

13:

14: /* Path Computation /*

15: **repeat**

Next_node_in_optimal path(B N)
append to
N N
until B

To avoid loops in the produced route, node is removed from the set N of available nodes. The process is repeated with a new initial state until the boundary set B is reached. In each iteration, Algorithm 2 is called to determine the next node on the path from the source to the destination . Algorithm 2 takes as an input an initial state , a boundary set B, the GOP size and the set N . It solves the dynamic programming problem described in by first creating the state space of the system and then using the value iteration method, starting from the boundary set and moving backwards. At each stage of the process, it also computes the optimal policy. At the end of the computation, the ID of the best node to be selected is returned by using the optimal policy for the first stage. In the source routing scheme, the routing decisions are made at the source node ahead of time and before the packet enters the network. Therefore, source routing is an open-loop control problem where all decisions have to be made in the beginning. The decisions are taken sequentially; a decision at a stage corresponds to the choice of the next-hop node at the node corresponding to the stage. The source node cannot know exactly the state at the th stage of the selection process because of the randomness of the second component of the state. It has to estimate at each stage the value of and use this estimate to make a decision for that stage.

The sequence of steps followed by each node in the network

Algorithm 2: Next node in optimal path
Input: initial state , boundary set B
Input: set of available nodes N
Input: frame size
Output: next node in the optimal path

/* Initialization Phase */
C
X N C
X

/* Optimal Control Computation */
for TO 1 **do**
if then
for all X **do**
end for
else
for all X **do**
end for
end if
end for
return

The flowchart that corresponds to the operation of the source node is depicted in while the flowcharts for an intermediate node and the destination node are shown in

4 PROPOSED SYSTEM

In this paper, our thesis is that the user-perceived video quality can be significantly improved by accounting for application requirements, and specifically the video distortion experienced by a flow, end-to-end. Typically, the schemes used to encode a video clip can accommodate a certain number of packet losses per frame. However, if the number of lost packets in a frame exceeds a certain threshold, the frame cannot be decoded correctly.

5 CONCLUSION

In this paper, we argue that a routing policy that is application aware is likely to provide benefits in terms of user-perceived performance. Specifically we consider a network that primarily carries video flows. We seek to understand the impact of routing on the end-to-end distortion of video flows. Toward this, we construct an analytical model that ties video distortion to the underlying packet-loss probabilities. Using this model, we find the optimal route (in terms of distortion) between a source and a destination node using a dynamic programming approach.

6 REFERENCES

[1] ISO/IEC JTC1/SC29/WG11, "ISO/IEC 14496—Coding of audio-visual objects," [Online]. Available: http://mpeg.chiariglione.org/standards/mpeg-4/mpeg-4.htm

[2] T. Wiegand, G. J. Sullivan, G. Bjontegaard, and A. Luthra, "Overview of the H.264/AVC video coding standard," *IEEE Trans. Circuits Syst. Video Technol.*, vol. 13, no. 7, pp. 560–576, Jul. 2003.

[3] D. S. J. D. Couto, D. Aguayo, J. Bicket, and R. Morris, "A highthroughput path metric for multi-hop wireless routing," in *Proc. 9th MobiCom*, San Diego, CA, USA, Sep. 2003, pp. 134–146.

[4] J. M. Boyce, "Packet loss resilient transmission of MPEG video over the internet," *Signal Process., Image Commun.*, vol. 15, no. 1–2, pp. 7–24, Sep. 1999.

[5] Y.-C. Lee, J. Kim, Y. Altunbasak, and R. M. Mersereau, "Layered coded vs. multiple description coded video over error-prone networks," *Signal Process., Image Commun.*, vol. 18, no. 5, pp. 337–356, May 2003.

[6] J. Chakareski, S. Han, and B. Girod, "Layered coding vs. multiple descriptions for video streaming over

multiple paths," *Multimedia Syst.*, vol. 10, pp. 275–285, 2005.

[7] Y. Wang, S. Wenger, J. Wen, and A. K. Katsaggelos, "Real-time communications over unreliable networks," *IEEE Signal Process. Mag.*, vol. 17, no. 4, pp. 61–82, Jul. 2000.

[8] R. Zhang, S. L. Regunathan, and K. Rose, "Video coding with optimal inter/intra-mode switching for packet loss resilience," *IEEE J. Sel. Areas Commun.*, vol. 18, no. 6, pp. 966–976, Jun. 2000.

[9] J. Xiao, T. Tillo, and Y. Zhao, "Error-resilient video coding with end-to-end rate-distortion optimized at macroblock level," *EURASIP J. Adv. Signal Process.*, vol. 2011, no. 1, p. 80, 2011.

[10] M. T. Ivrlaˇc, L. U. Choi, E. Steinbach, and J. A. Nossek, "Models and analysis of streaming video transmission over wireless fading channels," *Signal Process., Image Commun.*, vol. 24, no. 8, pp. 651–665, Sep. 2009.

[11] Y. J. Liang, J. G. Apostolopoulos, and B. Girod, "Analysis of packet loss for compressed video: Effect of burst losses and correlation between error frames," *IEEE Trans. Circuits Syst. Video Technol.*, vol. 18, no. 7, pp. 861–874, Jul. 2008.

[12] D. Li and J. Pan, "Performance evaluation of video streaming over multi-hop wireless networks," *IEEE Trans. Wireless Commun.*, vol. 9, no. 1, pp. 338–347, Jan. 2010.

[13] Y. Wang, Z. Wu, and J. M. Boyce, "Modeling of transmission-loss induced distortion in decoded video," *IEEE Trans. Circuits Syst. Video Technol.*, vol. 16, no. 6, pp. 716–732, Jun. 2006.

[14] D. Migliorini, E. Mingozzi, and C. Vallati, "Performance evaluation of H.264/SVC video streaming over mobile WiMAX," *Comput. Netw.*, vol. 55, no. 15, pp. 3578–3591, Oct. 2011.

[15] E. Alotaibi and B. Mukherjee, "A survey on routing algorithms for wireless ad-hoc and mesh networks," *Comput. Netw.*, vol. 56, no. 2, pp. 940–965, Feb. 2012.

[16] L. Hanzo and R. Tafazolli, "A survey of QoS routing solutions for mobile ad hoc networks," *IEEE Commun. Surveys Tuts.*, vol. 9, no. 2, pp. 50–70, Apr. 2007.

[17] W. Wei and A. Zakhor, "Robust multipath source routing protocol (RMPSR) for video communication over wireless ad hoc networks," in *Proc.*

IEEE ICME, Taipei, Taiwan, Jun. 2004, pp. 1379–1382.

[18] J. Chen, S.-H. G. Chan, and V. O. Li, "Multipath routing for video delivery over bandwidth-limited networks," *IEEE J. Sel. Areas Commun.*, vol. 22, no. 10,

[19] S. Mao, Y. T. Hou, X. Cheng, H. D. Sherali, S. F. Midkiff, and Y.-Q. Zhang, "On routing for multiple description video over wireless ad hoc networks," *IEEE Trans. Multimedia*, vol. 8, no. 5, pp. 1063–1074, Oct. 2006.

[20] S. Mao, X. Cheng, Y. T. Hou, and H. D. Sherali, "Multiple description video multicast in wireless ad hoc networks," *Mobile Netw. Appl.*, vol. 11, no. 1, pp. 63–73, Feb. 2006.

[21] B. Rong, Y. Qian, K. Lu, R. Qingyang, and M. Kadoch, "Multipath routing over wireless mesh networks for multiple description video transmission," *IEEE J. Sel. Areas Commun.*, vol. 28, no. 3, pp. 321–331, Apr. 2010.

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