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Scalable Video Streaming over Wireless Access Networks

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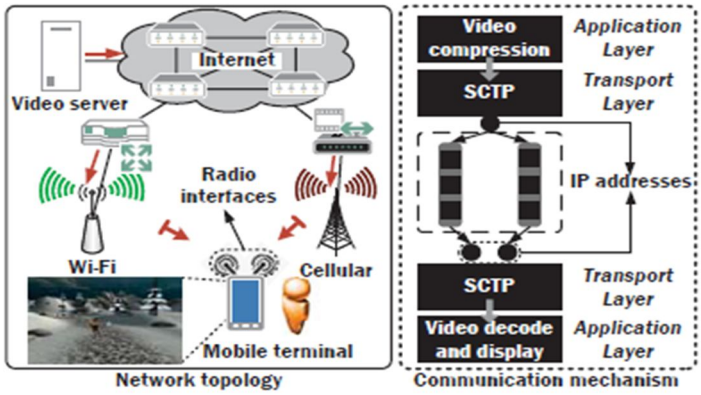
Abstract: ***Cloud mixed media administrations give a competent, adaptable, and versatile information preparing technique and offer an illustration for the client requests of high calibre, differentiate sight and sound. As a rule, getting to sight and sound video benefits through systems is never again a problem. The real video stages, for example, YouTube and Amazon, have great administration styles and give clients to share interactive media recordings effectively with enhanced administrations. Regardless of what the administration is, clients will dependably anticipate ground-breaking, sound and stable capacities. For sight and sound recordings, solidness is of the best significance. As astute cell phones and remote systems turn out to be increasingly prevalent, organize administrations for clients are never again constrained to the home. Mixed media data can be acquired effectively utilizing cell phones; enabling clients to appreciate wherever arrange administrations.***

Index Terms: ***Real-time video, Stream control protocol, Energy awareness, Concurrent multipath transfer, Heterogeneous wireless networks.***

I. INTRODUCTION

The technological advancements in network infrastructures and wireless devices enable mobile users to surf the Internet with ubiquitous access options, e.g., cellular networks (UMTS, HSDPA, LTE), wireless local area networks (802.11 family), and broadband wireless networks (LTE, Wi MAX). The state-of-the-art mobile terminals (e.g., the Samsung S5 smart phones and Mushroom products are equipped with multiple radio interfaces to concurrently receive data through multiple wireless access networks. With the popularity of such multi homed mobile terminals, the future remote systems administration is required to join heterogeneous access choices for giving amazing portable administrations.



An important transport-layer protocol standardized by the IETF (Internet Engineering Task Force) is SCTP that is to enable multiway data transfer over communication networks with multi homed terminals. Therefore, Sa promising transport-layer solution to support CMT of real time multimedia traffic over heterogeneous wireless networks is proved to be SCTP. Simultaneously, a higher energy consumption of wireless devices requires concurrent multipath video transmission. Contemporary mobile terminals are usually powered by batteries with limited capacities and the radio communication modules (e.g., using Wi-Fi, 3G, and LTE network interfaces) constitute the main portion of energy consumption.

Therefore, multimedia quality is dependent on the good put performance of data traffic transmission. However, the tradeoff between energy consumption and good put performance for multi homed multi media communication is not taken into account in the existing CMT solutions. This paper investigates the relationship between energy and good put for real-time multimedia transmission with SCTP over heterogeneous wireless networks.

II. LITERATURE SURVEY

1) *Paper Title:* Distortion-Aware Scalable Video Streaming to Multi network Clients.

a) *Author:* Nikolaos M. Freris, Cheng-Hsin Hsu, Jatinder Pal Singh and Xiaoqing Zhu, Member, IEEE.

b) *Abstract:* The goal of minimizing the distortion of the received videos is why we are considering the problem of scalable video streaming from a server to multi network clients over heterogeneous access networks. This problem has multiple applications including: 1) mobile devices that connects to multiple licensed and ISM bands, and 2) intellectual multi radio devices employing spectrum bonding. This paper is to discover how to transmits the correct video packets over the networks. In order to capture the network conditions and video characteristics and develop an integer program for packet scheduling, the models are being presented by us. We develop heuristic algorithms for deterministic packet scheduling and convex optimization problems for randomized packet scheduling to solve the integer program exactly which is typically not tractable. A thorough study of the tradeoff between performance and computational complexity is carried out and convex programming-based algorithm that yields good performance while being suitable for real-time applications is being proposed. We conduct extensive trace-driven simulations to rate the proposed algorithms using real network conditions and scalable video streams. The results show that the proposed convex programming-based algorithm: 1) the rate control algorithms defined in the Datagram Congestion Control Protocol (DCCP) by about 10–15 dB higher video quality is outstripped; 2) average delivery delay by over 90% compared to DCCP has been reduced; 3) higher average video quality of 4.47 and 1.92 dB than the two developed heuristics is being resulted; 4) runs efficiently, up to six times faster than the best-performing heuristic; and 5) does indeed provide service differentiation among users.

c) Conclusion: In this paper, a various usage scenarios has been addressed about video streaming from a server to multinetwork clients over various access networks. More precisely, the problem of joint rate control and stream adaptation as an optimization problem of minimizing the expected distortion of the received videos subject to constraints has been abstracted based on network conditions.This is being strictly formulated among the between performance and runtime have been studied; one of our randomized algorithms (TTC) has a good approximations to the randomized packet scheduling problem has been discovered and the tradeoff. So as to minimize a cost function of the expected distortion at the receiver side, the access network each transmitted video packet is sent over. Runtime at the cost of less performance, while the other one (MC) has better performance at the cost of high complexity.

TC

2) *Paper Title:* A Low Latency Scheduling Approach for High Definition Video Streaming over Heterogeneous Wireless Networks

a) *Author:* Jiyan Wu, Jingqi Yang, Xiaokun Wu and Junliang Chen , Beijing

b) *Abstract:* The problem of high definition video transmission in a heterogeneous wireless network from a video server to a multi homed client is considered. Simultaneously, a single wireless network is limited in transmission performance (e.g., available bandwidth and link delay); And at the same time, the high definition video streaming is marked by high transmission rate and large-size video frames. So, the end-to-end video frame delay becomes a hugely challenging problem which is unfavorable for real-time video applications. In this paper, a novel planning approach named SFL is proposed, which purposefully parts vast size video outlines into sub-outlines and sends every one of them onto an alternate remote system to the multi homed customer. This methodology can overhaul the casing level defer execution for better video quality. A optimization problem of video streaming allocation for minimizing the end-to-end delay based on the network calculus is formulated and solution with the water filling algorithm is derived. Using real-time H.264 video streaming, the performance of SFL is measured. Copying results demonstrate that SFL surpasses existing edge level booking approaches in improving casing level deferral just as in improving video quality as far as PSNR .

c) Conclusion: In this paper, SFL, a scheduling approach for HD video streaming in a different wireless network is being presented by us. The proposed approach is different from existing approaches in that we split video frames into sub-frames and schedule each of them to a different wireless network to the multi homed client. The scheduling granularity of SFL contributes to substantially improve the end-to-end frame delay and enhance the video quality. SFL is an application layer solution and only with the minimal modificated server and client . For future work, we may consider: (1) enlisting the video rate adaption for dynamically adjusting the transmission rate, and (2) put in application the Forward Error Correction approach for overcoming the enormous channel loss that is to be caused.

3) *Paper Title:* Quality-Driven Resource Allocation for Wireless video Transmissions Under Energy Efficiency and Delay Constraints

a) *Author:* Chuang Ye, M. Cenk Gursoy , (Senior Member, Ieee), And Senem Velipasalar , (Senior Member, Ieee)

b) *Abstract:* In this paper, wireless video transmissions under total bandwidth and energy efficiency constraints are studied. The quality of service requirements such as statistical delay constraints are also considered, to provide the desired performance levels to the end-users in real-time video transmissions. Effective capacity is used as the throughput metric in the presence of such statistical delay constraints since deterministic delay bounds are difficult to guarantee due to the time-varying nature of wireless fading channels. A multiuser setup where different users have different delay guarantees is addressed. Following characterizations from the rate-distortion theory, a logarithmic model of the quality-rate relation is used for predicting the quality of the reconstructed video in terms of the peak signal-to-noise ratio at the receiver side. The sum video quality subject to total bandwidth and minimum EE constraints are derived that are maximized by the optimal bandwidth allocation and the optimal power allocation/power control policies. Investigations are being done for the five different resource allocation and the joint optimization of the bandwidth allocation and power control provides the best performance are shown as the result. The tradeoff between EE and video quality is also demonstrated since higher EE results in lower quality of received video sequence.

c) *Conclusion:* In this paper, we have addressed the maximization of the sum quality of received video sequences under total band- width and EE constraints and delay QoS requirements in a downlink wireless model. In particular, we have studied sum-quality maximizing bandwidth allocation and power allocation/power control policies. Optimal strategies for determining the transmission power levels for each user are identified based on the allocated bandwidth and the given EE constraint. The quality of the received video is shown to be an increasing concave function of the bandwidth. With these characterizations, we have simplified the optimization problem as a bandwidth allocation problem and have shown it to be a convex optimization problem. The simulation results reveal that increasing the QoS exponent _ leads to a decrease in quality. Additionally, increasing the EE threshold decreases the performance. Overall, we have considered different strategies of bandwidth allocation and power allocation/power control, and we have demonstrated that the JBAPC has the best performance since it maximizes the PSNR by allocating bandwidth and performing power control jointly while taking advantage of the instantaneous CSI of each channel

4) *Paper Title:* Composite chaotic pseudo-random sequence encryption algorithm for compressed video

a) *Author:* Yuan Chun, Zhong Yuzhuo, Yang Shiqiang

b) *Abstract:* A good real-time encryption with high flexibility is achieved by Stream cryptosystems, that implements encryption by selecting parts of the block data and header information of the compressed video stream. Chaotic random number generator-based approaches, for example, logistics maps, are better promising approaches but are exposed to attacks by nonlinear dynamic forecasting. So as to encode the packed video with the co ordinations map with a Z field straight congruential calculation to reinforce the security of the mono-disorderly cryptography, a composite clamorous cryptography plot was created. The real-time performance and flexibility of the chaotic sequence cryptography is maintained by the scheme. The scheme also integrated asymmetrical public-key cryptography and encryption and identity authentication of control parameters at the initialization phase.

c) *Conclusion:* A composite chaotic sequence encryption approach combines the original logistics map with the linear congruentual algorithm in the Mersenne field to provide real-time processing for the security requirements of multimedia streams. The algorithm has the following advantages: Preserves the advantages, the flexible implementation of mono-chaotic schemes, adaptable parameters, and a large pseudo-random sequence space. Effectively resists nonlinear forecasting and attractive point attacks. Less iterations and computation complexity to develop large sequences with reasonable pseudo randomness. 4) Layered and content based encryption can be used for real-time, effective encryption of compressed video. 5) Public cryptosystem is employed for control parameter encryption and signatures for network security requirements.

5) *Paper Title:* How Dia-Shows Turn Into Video Flows: Adapting Scalable Video Communication to Heterogeneous Network Conditions in Real-Time

a) *Author:* Fabian Jager, Thomas C. Schmidt, Matthias Wahlisch

b) *Abstract:* Video conferencing over IP (VCoIP) is a major trend in current Internet communication and has particularly spread to the mobile realm. Users now a days face the problem of heterogeneous and oscillating network conditions. The scalable video coding (SVC) is the promising solution. An adaptation of the video stream to the available bandwidth is made, but a reliable bandwidth estimation is required. Adaptation times for few videos at fluctuating network conditions are critical, and to avoid congestion a fast strategy for bandwidth estimation is needed . In this project, the capabilities of the sender and the receiver are analysed to adapt the video coding to changing network conditions. An early congestion indicator at the sender side based on the jitter variation is also being derived. A sustained good put to extract a feasible scaling is used for receivers. We reveal a

faster congestion detection at the sender that are also more robust but less accurate than probing at the receiver during thorough evaluations that include real-world 3G networks.

c) *Conclusion:* Multimedia applications with high quality video streams are likely to cause network congestions and thus need to be aware of the network conditions to sustain fluency. Particularly on access links or in the presence of heavily changing traffic, a quick reaction is crucial for real-time multimedia applications more beneficial than a slow but more accurate video adaptation. In this work, we presented a combination of a receiver-sided and a sender-sided congestion detection approach combined with scalable video adaptation to address this problem. Our algorithms are simple, non-intrusive and easy to implement. For a proof-of-concept and for detailed experimental evaluations, we developed a scalable conferencing application based on the DSVC codec and previous work. The application encodes a raw video, sends it over the network and detects impending congestions on both ends. Our test results give evidence, that our approaches ensure a fast and reliable video stream adaptation and are capable of detecting a link congestion early enough for avoid it so that it remains unnoticeable to users.

6) Paper Title: High-Quality Real-Time Video Stabilization Using Trajectory Smoothing and Mesh based Warping

a) *Author:* Zhongqiang Wang, Lei Zhang (Member, IEEE) and Hua Huang (Member, IEEE)

b) *Abstract:* Some state-of-the-art video stabilization methods can achieve quite good visual effect, but they always cost a lot of time. current real-time video stabilization methods were not found generate satisfactory results. Here, a novel trajectory-based video stabilization method is proposed that generates high-quality results in real time. Since many techniques are proposed for acceleration, our method runs fast. Trajectories are extracted, pre-processed, and smoothed in the trajectory smoothing step,. For pre-processing, and binomial _altering, a video splitting algorithm is proposed which is used for smoothing. Both of them are simple and fast. We calculate a spatially varying warp in the frame warping step that is directed by a grid mesh for each frame. The transformation matrix of each grid is calculated instead of solving time consuming global optimization problems using nearby trajectories in our method that leads to very high speed. Our method is implemented and processed on a variety of videos. Experiments show that our algorithm can run in real time while the stabilization effect is comparable with state-of-the-art methods.

c) *Conclusion:* In this paper, we propose a high quality real-time video stabilization method. Unlike previous real-time methods which only use simple 2D 36+motion models, our method use trajectory based motion model and thus can generate high quality results. Our method contains a trajectory smoothing step and a mesh-based frame warping step. Many acceleration techniques are used in our method to make it much faster than prior trajectory based methods. Meanwhile, the visual effect of our method is still comparable to state-of-art video stabilization methods. Experiments on many different kinds of videos show the good visual effect of our method and the speed data show its high speed.

7) *Paper Title:* Distributed scheduling scheme to stream video over multi- channel multi-radio multi-hop wireless networks

a) *Author:* Liang Zhou, Xinbing Wang, Wei Tu, Gabriel-Miro Muntean, Benoit Geller

b) *Abstract:* An imperative plan of adjusting multi-client video spilling over remote systems is the means by which to advance the deliberate planning by keenly using the accessible system assets while, in the meantime, to fulfill each video's Nature of Administration (QoS) prerequisite. In this work, the problem of video steaming over multi-channel multi-radio multi-hop wireless networks is studied and fully distributed scheduling schemes with the goals of minimizing the video distortion is developed and certain fairness is obtained. A general distortion model according to the network's transmission mechanism is being constructed and also video's rate-distortion characteristics is studied. After that we a convex optimization problem is scheduled and distributed solution by joint considering channel assignment, rate allocation, and routing is proposed. Particularly, a stability between the selfish motivation of minimizing video distortion and the global performance of minimizing network congestions is striked by each stream. Also, the proposed scheduling scheme by addressing the fairness problem is extended. We have proposed a media-aware distortion-fairness strategy which is unlike prior works that target at bandwidth or demand fair, aware of the characteristics of video frames and ensures max-min distortion-fairness sharing among video streams. We also provide extensive simulation results that demonstrate the potent of our proposed schemes.

c) *Conclusion:* In this paper, we have developed fully distributed scheduling schemes that jointly solve the channel-assignment, rate allocation, routing and fairness problems for video streaming over multi-channel multi-radio networks. Particularly,far from conventional scheduling schemes focus on optimal system throughput or scheduling efficiency, our work aims at achieving minimal video distortion and certain fairness by jointly considering media-aware distribution and network resource allocation. To demonstrate the effectiveness of our proposed schemes, a large simulation results are provided. The results in this paper have some interesting implications on the practical use of multi-radio multi-channel multi-hop wireless networks, *i.e.*,

multimedia sensor network is a good example. As we know, current sensor networks due to their limit transmit capacities can hardly transmit large amount of multimedia data concurrently.

8) Paper Title: Measurement, Modelling and Analysis of a Peer-to-Peer File- Sharing Workload

1) Author: Krishna P. Gummadi, Richard J. Dunn, Stefan Saroiu, Steven D. Gribble, Henry M. Levy, and John Zahorjan

2) Abstract: For an astonishing volume of current Internet traffic, Peer-to-peer (P2P) file sharing accounts is used. This paper investigates deeply into modern P2P file sharing systems as well as the forces that drive them. So, our understanding of P2P file sharing workloads is increased and their implications for future multimedia workloads is also higher. We have used a three-tiered approach. Initially, we went through a 200-day trace of over 20 terabytes of Kazaa P2P traffic collected at the University of Washington. Then, a model of multimedia workloads is developed that lets us isolate, vary, and explore the smack of key system parameters. This model, which we measure with statistics from our trace, will enable us to confirm various hypotheses about file-sharing behavior observed in the trace. Third, the potential impact of locality awareness in Kazaa is being explored. Dramatic differences between P2P file sharing and Web traffic is resulted. For instance, we show how the changelessness of Kazaa's sight and sound articles drives customers to get protests at most once; conversely, a World-Wide Web customer may get a prominent page a large number of times. Moreover, we demonstrate that: (1) The Kazaa popularity distribution is deviated substantially from Zipf curves due to this “fetch-at-most-once” behavior we see for the Web and (2) this caused significant implications for the performance of multimedia file-sharing systems. Hose workload is driven by document change, unlike the Web. We showcase that the clients’ fetch-at-most once behavior, the creation of new objects, and the inclusion of new clients to the system are the primary forces that make multimedia workloads such as Kazaa. A substantial untapped locality in the Kazaa workload is also shown by us. Finally, the potential bandwidth savings that locality-aware P2P file-sharing architectures would achieve is quantified.

3) Conclusion: Peer-to-peer file sharing now dominates all other sources of traffic on the Internet, yet the basic forces that drive this workload are still poorly understood. In this paper, we analyzed a 200-day trace of Kazaa P2P file-sharing traffic collected at the University of Washington in order to dig deeper into the nature of file-sharing workloads. Our results show that P2P file-sharing workloads are driven by considerably different processes than the Web. Kazaa is a batch-mode system with extremely patient users who often wait days, or even weeks, for their objects to fully download. As Kazaa clients agent hey demand less from the system, partially because of attrition. The objects that Kazaa users exchange are large, immutable video and audio objects, causing the typical client to fetch any given object at most once. The popularity of Kazaa objects changes over time: popularity tends to be short-lived, and popular objects tend to be recently born. Based on these results we conclude that client births and object births are the fundamental processes driving P2P file sharing workloads; in contrast, the Web is largely driven by changes to objects. We demonstrated that the “fetch-almost once” behavior of clients causes the aggregate popularity distribution of objects in Kazaa to deviate substantially from Zipf curves we typically see for the Web.

9) Paper Title: Behaviour Signature for Fine-grained Traffic Identification

a) Author: Sung-Ho Yoon, Jun-Sang Park and Myung-Sup Kim

b) Abstract: Traffic identification has become a key issue for efficient network management, with the rapid development of the Internet and a vigorous emergence of new applications. Though various methods have been proposed, there are still many limitations to achieving fine-grained as well as application-level traffic identification. In this paper, a signature model for Internet traffic identification called a behavior signature that utilizes the inter-flow relation of application traffic is proposed. The proposed behavior signature is a unique traffic behavior pattern appearing in the initial packets of plural traffic flows while the specific function is conducted by an application with a combination of multiple optional traffic features. Comparing other existing signature models that usually focus on a singular packet or flow for feature extraction and traffic identification, it’s contrast. The feasibility and applicability of the proposed behavior signature by developing an extraction and identification algorithm and by conducting experiments on several popular applications is also being proved.

c) Conclusion: In this paper, we proposed the behavior signature and an automatic extraction method using the first request packets of multiple traffic flows when a single function is executed to identify big data traffic. This signature overcomes the limitation of previous methods using packet and flow units. A ten popular applications in order to prove the feasibility of the proposed signature method is also proposed. Although our method shows a low recall, the precision is 100% for all applications, which means that all extracted signatures correctly identified the traffic. A comparison test on the payload signature method proved that a behavior signature can be utilized as a supplementary method to identify encrypted traffic flows. An improved performance in terms of execution time and completeness is proved in the proposed method.

10) *Paper Title:* Aggregated QoS Mapping Framework for Relative Service Differentiation-Aware Video Streaming

a) *Author:* Jitae Shin, Jin-Gyeong Kim, JongWon Kim, D. C. Lee, and C.- C. Jay Kuo

b) *Abstract:* The Quality of Service (QoS) interaction at the edge of differentiated service (DiffServ) domain, denoted by video gateway (VG) is investigated here. VG is responsible for coordinating the QoS mapping between video applications and DiffServ enabled network. To accomplish the goal of achieving economical and high-quality end-to-end video streaming, which utilizes its awareness of relative service differentiation, the proposed QoS control framework includes the following three components: 1) the relative priority based indexing and categorization of streaming video content at sender, 2) the differentiated QoS levels with load variation in DiffServ networks, and 3) the feedforward and feedback mechanisms assisting QoS mapping of categorized index to DS level at the proposed VG. Especially, we focus on building a framework for dynamic QoS mapping, which intends to overcome both the QoS demand variations of CM applications (e.g., varying priorities from aggregated/categorized packets) and the QoS supply variations of DiffServ network (e.g., varying loss/delay due to fluctuating network loads). Thus, with the proposed QoS controls in both feedforward and feedback fashion, enhanced quality provisioning for CM applications (especially video streaming) is investigated under the given pricing model (e.g., DS level differentiated price/packet).

c) *Conclusion:* This paper discusses the QoS mapping between categorized-packet video and proportional DiffServ network within relative service differentiation framework. In order to show the performance of VG, we set encoded video stream as an example of streaming media in simulated DiffServ network. Our previous works [7, 10] showed that the QoS mapping between categorized-packet video and DS level can give the gain of end-to-end video quality in terms of delay and loss under total cost constraint. However, those works are limited to per-flow based feed forward QoS mapping. This present paper extends them to full-scope, having three granularities of session/packet/class and feed forward/feed back QoS control.

11) *Paper Title*: Energy Dissipation Model for 4G and WLAN Networks in Smart Phones

a) *Author:* Shalini Prasad, Research Scholar, Jain University, S. Balaji, Center for Engineering Technologies

b) *Abstract:* Using the modernization of the telecommunication standards, a considerable evolution of various technologies in order to assist cost effective communication has been made. In this regard, the penetration of fourth generation communication services or commonly known as 4G mobile networks reached almost every part of the world to offer faster and seamless data connectivity. However, the smart phone supporting 4G services have their energy drained. Also an algorithm is presented in this paper that is capable of evaluating the actual amount of energy being abandoned while using next generation mobile networks. A comparative analysis of energy dissipation of 4G networks with other wireless local area networks to understand the networks that cause more energy dissipation is also performed in this study.

c) *Conclusion:* One of the critical problems in smart phones is energy consumption and execution of multiple mobile applications calls for extensive battery lifetime as well as energy conservation schemes is successful. Understanding the importance of various threads running inside the applications is the biggest problem with the smart phone devices The temporary minimization of energy which has potential impact on application performance on the mobile device is by existing energy conservation schemes call for suppressing some threads . Therefore, to study the signaling properties of the usage of mobile networks a simple and yet robust framework is required and then perform investigation on the energy drainage. A precise detection of energy dissipation will always assist the energy saving schemes is argued . In this research manuscript, such computational model that is capable of measuring accurate energy drainage rate is presented.

12) *Paper Title:* Energy Minimization for Quality Constrained Video with Multipath TCP over the Heterogeneous Wireless Networks.

a) *Author:* Jiyan Wu, Bo Cheng, Ming Wang, State Key Laboratory of Networking and Switching

b) *Abstract:* The bandwidth aggregation for mobile video delivery over heterogeneous access networks is shown by the advancements in wireless infrastructures and communication technologies that is always needed. The transport protocol recommended by IETF to enable concurrent data transmissions over multiple communication paths is Multipath TCP (MPTCP). However, to deliver user-satisfied video services with the existing MPTCP schemes is still a problem due to the contradiction between mobile device energy and video distortion. This paper presents an Energy- Distortion Aware MPTCP (EDAM) solution, to enable the energy-efficient and quality guaranteed video streaming,. Initially a systematic model to catch the vitality twisting tradeoff for multipath video transmission over heterogeneous remote systems is developed. Second, a video stream rate designation calculation is suggested that limits the vitality utilization while accomplishing target video quality dependent on utility augmentation hypothesis. Evaluation of the performance of the proposed EDAM through extensive emulations in Exact involving real-time H.264 video streaming is done. Evaluation results shows us that EDAM outperforms

the reference MPTCP schemes in reducing energy consumption, as well as in improving video PSNR (Peak Signal-to-Noise Ratio).

c) *Conclusion:* The ever-growing popularity of powerful mobile terminals enables individual users to access the Internet and watch videos from everywhere. MPTCP is the standard transport layer protocol to enable multipath data transfer in multi homed communication environments. In this paper, we propose a novel Energy-Distortion Aware MPTCP (EDAM) scheme to enable the energy efficient and quality guaranteed video streaming over heterogeneous wireless networks. We develop solutions for the flow rate allocation and data retransmission control through modeling and analysis. EDAM outperforms the existing MPTCP schemes in reducing the energy consumption and improving the video quality (in terms of PSNR) is shown as the Experimental results . As future work, the congestion control will be improved and buffer management algorithms in EDAM to further improve video data throughput is sent.

13) *Paper Title:* Good put-Aware Load Distribution for Real-Time Traffic over Multipath Networks

a) *Author:* Jiyan Wu, Student Member, IEEE, Chau Yuen, Bo Cheng, Yanlei Shang, and Junliang Chen.

b) *Abstract:* In deploying the limited network resources available to support traffic transmissions load distribution is a key research issue. For enhancing traffic performance and network utilization developing an effective solution is critical. In this paper, the problem of load distribution for real-time traffic over multipath networks is investigated. A large end-to-end delay and consecutive packet losses can significantly degrade the traffic flow's good put due to the path diversity and unreliability in heterogeneous overlay networks, whereas existing studies mainly focus on the delay or throughput performance. We propose a Goodput-Aware Load distribution (GALTON) model to address the challenging problems, which includes three phases: (1)to accurately sense the quality of each transport link, path status estimation (2) to optimize the aggregate good put of input traffic, flow rate assignment and (3) deadline-constrained packet interleaving to mitigate consecutive losses. Presentation for statistical derivation for various path load distribution is done and the solution based on utility theory is derived. Through semi-physical emulations in Exacta involving both real Internet traffic traces of the proposed model is evaluated. GALTON outperforms the existing traffic distribution models in terms of good put, video Peak Signal-to-Noise Ratio (PSNR), end-to-end delay, and aggregate loss rate is shown as result.

c) *Conclusion:* The exponential growth of data traffic over the Internet has become a major driving force for multi homed communications over parallel network paths. Despite the rapid development of network infrastructures, it is still a crucial challenge to effectively deliver real-time applications with stringent delay, throughput, and reliability requirements. This paper proposes a novel Good put-Aware Load Distribution (GALTON) model to optimize the good put performance of real-time traffic over multipath networks. Through modeling and analysis, we have developed solutions for path status estimation, flow rate assignment, and deadline-constrained packet interleaving. The emulation results demonstrate that GALTON is able to outperform existing traffic distribution models in terms of good put, video PSNR, delay and loss performance. The superiority of the proposed load distribution model in enhancing transmission reliability is theoretically analyzed based on Gilbert loss model and continuous time Markov chain. As future work, we will study the challenging problem of differentiated scheduling for real-time traffic flows with heterogeneous delay constraints.

14) *Paper Title:* Traffic-Aware Online Network Selection in Heterogeneous Wireless Networks

a) *Author:* Qihui Wu, Zhiyong Du, Panlong Yang, Yu-Dong Yao, Jinlong Wang

b) *Abstract:* The network selection problem in heterogeneous wireless networks is focused here. Considering quality of service (QoS) related criteria many traditional approaches select the best network which deletes diverse user demands. The networks maximizing the quality of experience (QoE) of users is aimed here. Most of the existing approaches cannot make effective selection decisions since they are vulnerable to the uncertainty in network state information though the availability and dynamics of network state information are considered. We have introduced the idea of online learning for network selection to address this issue. we formulate the network selection problem as a continuous time multi-armed bandit (CT-MAB) problem in this paper .To match typical traffic types of users with respective optimal networks in terms of QoE a traffic-aware online network selection algorithm (ONES) is designed. Moreover, the correlation among multiple traffic network selections is found that can be exploited to improve the learning capability. This encouraged us to propose another two more efficient algorithms: decoupled online network selection algorithm (D-ONES) and virtual multiplexing ONES (VM-ONES). Our online network selection algorithms attain around 10% gain in QoE is the results shown and the reward rate over non learning-based algorithms and learning based algorithms without QoE considerations.

c) *Conclusion:* In this paper, we studied the traffic aware online network selection framework in heterogeneous wireless networks. From the perspective of user demand, we aim to maximize the user's QoE reward. To address the availability issue of network

state information in a practical network environment, we formulate the network selection problem as a continuous time multi armed bandit problem. Three traffic aware online network selection algorithms, ONES, D-ONES and VM-ONES are proposed. By differentiating the traffic into multiple types with distinct QoE demands, the three algorithms attempt to match each type of traffic with its respective best network. The algorithms all achieve the optimal logarithmic order regret. Especially, D-ONES and VM-ONES obtain better online learning performance than ONES. Compared with some other algorithms, e.g., non learning-based algorithms and learning based algorithms without QoE consideration and traffic awareness, the proposed online network selection algorithms show considerable performance gains. In our future work, we expect to conduct simulations in a more detailed simulations environment. In addition, algorithms for multiple-user scenarios are needed.\

III. PROPOSED SYSTEM

An efficient interactive streaming service for diversified mobile devices and dynamic network environments is provided by the proposed system . transmission of its hardware and network environment parameters to the profile agent in the cloud environment, which records the mobile device codes and determines the required parameters when a mobile device requests a multimedia streaming service. Then transmits them to the QoS Management (QosM). The SVC code for the device is determined according to the parameters, and the Trans coding work via map-reduce to the cloud is handed over by then the SVC Transcoding Controller , that will increase the Trans coding rate. Through the service the multimedia video file is transmitted to the mobile device.

IV. CONCLUSION

For the prediction of network and hardware features, the DNEM and DBPM were used and the communication frequency and SVC multimedia streaming files most suitable for the device environment were determined . The overall prototype architecture was observed during this process and an experimental analysis was also carried out. The experimental data proved that the method could maintain a certain level of multimedia service quality for dynamic network environments and ensure smooth and complete multimedia streaming services.

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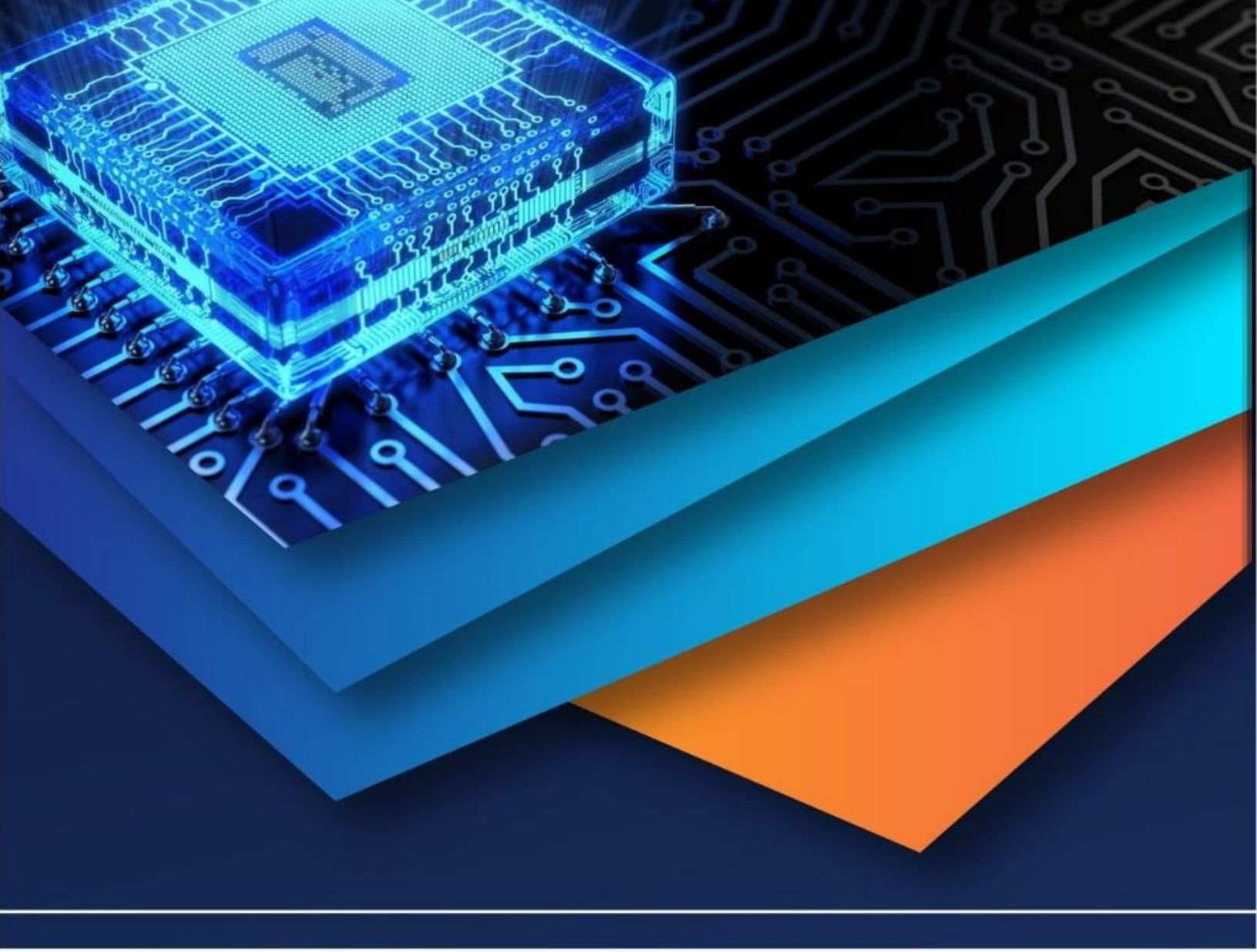

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