

Novel Efficient and Secure Protocol Design for Opportunistic Networks

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ABSTRACT:

The increase in transmission services has placed energy saving on the highest of current demands for mobile devices. Sadly, batteries' life has not been as extended because it would be fascinating. For that reason, reducing energy consumption in each task performed by these devices is crucial. During this work, a novel routing protocol, known as JOKER, is introduced. This proposal presents novelties in each the candidate choice and coordination phases, which enable increasing the performance of the network supporting transmission traffic also as enhancing the nodes' energy potency. JOKER is compared in different-nature test-benches with attendee routing protocol, showing its superiority in supporting a hard service like video-streaming in terms of QoE, whereas achieving an influence debilitating reduction in routing tasks

Keywords: QoE, OPPORTUNISTIC networks, joker

1. INTRODUCTION:

OPPORTUNISTIC networks have emerged as a replacement networking-paradigm that's attracting the analysis community's interest because of its potential for enhancing communications between mobile good devices [1], [2]. These networks area unit Associate in Nursing evolution of the MANETs (Mobile Ad-hoc NETWORKS), as well as new functionalities that build them additional economical than their precursors. Specifically, expedient networks cash in of the published nature of the wireless networks, i.e., direct communications between 2 nodes is overheard by nearest neighbors. In ad-hoc

multi-hop networks, ancient routing protocols like OLSR (Optimized Link State Routing) [3], AODV (Ad-hoc On-Demand Distance Vector) [4], or attendant (Better Approach To Mobile Ad-hoc Networking) [5] calculate a novel route between transmitter and receiver. Thus, every node simply considers one single neighbor because the next hop to succeed in a given destination. However, with expedient routing protocols every node selects a collection of its neighbors, spoken as candidates, because the potential next hops towards the ultimate destination. The manner every node selects its candidates and the way they coordinate one another to select the

foremost correct candidate because the actual forwarder area unit the 2 key challenges in expedient routing. These characteristics verify the effectiveness of the expedient routing algorithmic program [2], [6]. Having completely different candidates to forward a packet might provoke multiple copies of an equivalent packet within the network, Thus, adequate candidate coordination schemes area unit required so as to realize Associate in Nursing economical synchronization among the potential forwarders. moreover, betting on the topology and also the characteristics of the services flowing through the network, considering the best range of candidates isn't perpetually advantageous. In next sections this truth is clearly manifested and, beneath some conditions, considering an occasional range of candidates permits reaching higher levels of quality (Quality of user Experience) than using the next range of potential forwarders. Another necessary purpose touching ad-hoc networks is that the terminals' energy consumption. As these devices area unit sometimes battery hopped-up, the event of power-efficient techniques to diminish energy consumption in communication networks may be a compelling would like. Wireless card energy consumption includes a outstanding weight in mobile devices' power exhausting [7], thereby, the event of economical networking protocols and procedures is important so as to increase battery period.

Given the upper potency of expedient protocols compared to ancient proposals, the previous might represent a true various for reducing the energy consumed in routing tasks.

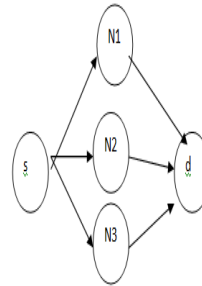


Fig 1: Network

2. Methodology:

In this work, a novel opportunistic routing algorithm is presented. This protocol, referred to as JOKER (auto-adJustable timeserving acKnowledgment/timEr-based Routing), gets some useful options from the pro-active ad-hoc routing protocol tender [5]. the most basis taken from tender is its simplicity relating to routing tasks, that entails low process and memory wants within the nodes, creating it appropriate for mobile devices with restricted process power. in an exceedingly previous work [8], authors showed the potential of tender to support multimedia system traffic in low-consumption nodes by tweaking a number of its configuration parameters. Thus, JOKER represents a leap forward aiming at

rising the potential of ad-hoc networks for transmission serious and strict traffic like multimedia system content whereas reducing energy consumption in routing tasks. Concretely, it's been designed to figure in IEEE 802.11 mobile devices, as this can be the end-users' most popular manner for accessing multimedia system services. To the authors' information, there's not any previous work addressing the exchange between the availability of quality for multimedia system services and therefore the reduction of nodes' energy consumption in timeserving networks. Hence, the most contributions of this paper square measure the following:

- an in depth description of the novel timeserving routing protocol JOKER is given. among this description, the most options of this protocol square measure compared with those of tender.
- a brand new metric for choosing candidates is developed. This new algorithmic program takes into consideration each the packet-delivery dependableness of the links and therefore the distance-progress towards . 2 totally different implementations of JOKER square measure given. the primary one has been coded to figure in an exceedingly network simulation surroundings, whereas the opposite has been developed to figure on real devices.
- A performance analysis of JOKER in terms of QoE (Quality of user Experience), QoS (Quality of Service), and energy consumption is applied. This study includes results for many JOKER parameter

characterizations so as to investigate their impact on the energy consumed by the wireless cards similarly because the quality of a extremely strict multimedia system service such as video streaming. These outcomes are compared with those attained by BATMAN.

0 7 15 23

Packet type	TTL	Packet Id
Final destination address		
Candidate one address		
Candidate n address		

Fig 1: JOKER HEADER

3. RELATED WORK:

During the last years, many works proposing novel expedient protocols for ad-hoc networks are given. though most of them square measure supported the opportunistic-routing foundations, completely different works introduced attention-grabbing proposals, a number of them even addressing QoS and/ or energy potency problems (for a additional in depth review, please see [6]). statue maker and



Chen [10] given 2 completely different spectrum-map empowered expedient routing protocols for normal and large-scale cognitive-radio ad-hoc networks. During this work, 2 completely different state-of-art network architectures square measure gathered together: psychological feature radio and expedient routing. Thus, once getting a spectrum map indicating the on the market spectrum among the region, the projected protocols create use of a packet-delivery strategy supported network secret writing. Therefore, the candidate coordination section is avoided. In turn, the candidates square measure chosen and ordered by victimization the end-to-end delay and ETX (expected range of transmissions) metrics. to boot, for large-scale situations, geographical info is additionally thought-about for choosing the simplest forwarders towards the ultimate destination. The projected protocols showed improved performance (in terms of end-to-end delay) as compared with alternative expedient protocols like additional (MAC-independent expedient Routing & Encoding) [11] and a shortest-path greedy algorithmic rule. Following an analogous approach, authors of [12] developed a routing protocol supported psychological feature networking with expedient routing for wireless sensing element networks. during this case, the candidate set choice criterion is that the distance between every neighbor and also the destination, increased with info

concerning the network density. In turn, rather than victimization network secret writing, the RTS/CTS (Request to Send / Clear to Send) strategy is adopted for the candidate coordination. The projected protocol was compared with a straightforward expedient spectrum access protocol and a geographic expedient routing protocol almost like GeRaF (GEographicRandom Forwarding) [13], showing to be the foremost economical in terms of outturn, delay and energy consumption in an enclosed atmosphere. alternative schemes victimization the network secret writing strategy square measure those given in [14]–[16]. within the case of [14], a multicast protocol was projected. Authors used completely different strategies: i) LPbased expedient routing structure, that defines the candidate set by taking into consideration the exchange between expedient forwarding and also the competition likelihood, ii) expedient feeding, which allows completely different nodes to function cooperative sources for feeding alternative multicast receivers, iii) quick batch moving, by that the initial supply will quickly begin causation coded packets of future batch, permitting the beingness of various batches within the network, and iv) inter-batch secret writing that allows up the outturn by victimization RLNC (Random Linear Network Coding) secret writing operations rather than the normal XOR secret writing theme. Results showed



however the projected algorithmic rule outperformed additional [11] and Pacifier [17] in terms of energy potency, throughput, and latent period. Likewise, works in [15], [16] projected unicast and multicast algorithms, severally, to boost the performance of period of time video communication in wireless networks. each algorithms given network-coding-based proposals aiming at up the information measure utilization and outturn of the network. The provided results showed however the projected protocols overcame the performance of alternative expedient routing algorithms. However, the test-benches used in each works appear to be restricted considering that simply one cooccurring video flow was streamed to guage static and pre-defined topologies composed of up to seven nodes. Gathering the ideas of network secret writing and content-based prioritization Seferoglu and Markopoulou projected a additional complete approach to expedient video secret writing for video-streaming taking into consideration the importance of video packets in network code choice [18]. By up the application-level outturn, their proposal reaches higher levels of quality (in terms of PSNR (Peak S/N Ratio)) than alternative routing protocols. From a special perspective, Wu et al. studied the matter of ungenerous behavior in multi-rate expedient networks, i.e., the case during which one node may manipulate its input/output metrics to guide its neighbors

to require routing selections for benefiting itself [19]. This truth may well be particularly harmful within the presence of extremely exacting services. During this work, authors introduced a brand new expedient routing protocol that ensures the fidelity of every node within the network, increasing the end-to-end outturn. By using associate degree incentive protocol, the given theme maximizes every node's payoff. Besides, the network outturn is additionally improved with the presence of ungenerous nodes. add [20] self-addressed the impact of link correlation within the candidate set choice. Thus, a link correlation aware metric was projected aiming at enhancing the performance of the routing tasks by choosing the nodes with low related links as IEEE JOURNAL ON hand-picked AREAS IN COMMUNICATIONS, VOL.34, NO.5, MAY2016 forwarder candidates. The performance of the projected protocol was evaluated in an exceedingly wireless sensing element network, showing an excellent potency against a correlation unaware protocol in terms of energy consumption, range of transmissions and delivery quantitative relation. Taking into consideration special reusability, Meng et al. introduced the thought of special reusability-aware (single path and any path) routing in [21]. They not solely investigate the 2 approaches however conjointly projected associate degree algorithmic rule for node choice, price calculation, and forwarding list



determination progressing to maximize the end-to-end outturn in multi-hop 802.11 wireless networks. Their performance analysis results proof a notable improvement compared to the SAF (Shortest Any-path First) algorithmic rule. Concerning energy potency, add [22] given associate degree expedient routing protocol for minimizing the energy consumption of the nodes composing a set wireless sensing element network. Centered on a multi-hop chain topology, the projected algorithmic rule takes into consideration 2 key metrics to pick the candidate set: the space of the sensing element nodes to the sink and also the residual energy of every node. The candidate-coordination section is dole out following associate degree ACK strategy: every candidate with success receiving the data-packet replies associate degree ACK to the sender once a given amount determined by its priority. This operation is performed given that no alternative ACK from a higher-priority node has been overheard. once the ACK reply is completed, the data packet is forwarded. The projected protocol was tested in each simulation and realistic test-benches, showing higher performance, in terms of energy consumption, than GeRaF [13] and a MTE (Minimum Transmission Energy) protocol. add [23] conjointly focuses on up energy potency however from a special perspective, by victimization the pismire colony conversation and geographic forwarding. Results showed that their

proposal will increase the wireless sensing element network lifespan and maintains strict packet delay wants, too. Finally, from a QoS perspective, add [24] projected to use GOR (Geographic expedient Routing) for multi constrained QoS provisioning in wireless sensing element networks. Thus, irresponsibleness and end-to-end delay QoS constraints were thought-about. to the present finish, the projected theme makes use of each the packet reception quantitative relation and also the distance progress towards the ultimate destination provided by every one-hop neighbor as metrics to assemble the candidate set. The candidate coordination is performed by using an analogous ACK strategy like that followed in [22]. Results showed an excellent performance of the projected protocol in terms of end-to-end delay, communication price, and delivery quantitative relation, that square measure greatly valued metrics in situations with strict QoS necessities. Though the mentioned works propose a large vary of performance enhancements to different-nature services, there's still a scarcity concerning the trade-off between multimedia-service QoE and power consumption in ad-hoc networks. to boot, most of the projected expedient routing protocols got to create deep modifications to the wireless card protocol stack by modifying or exchange the Macintosh layer protocol (e.g., 802.11). Thus, the algorithmic rule projected during this work

tries to hide these gaps by i) up the QoE of streaming services whereas reducing the energy consumed in routing tasks, and ii) being a ready-to-use piece of software system compatible with alternative layers' protocols and with no need the modification of the off-the-rack implementations of those protocols.

5. CONCLUSION:

In this work, routing protocol, referred to as JOKER, addressing the trade-off between QoE in transmission transmissions and energy consumption has been bestowed. Following the expedient paradigm, JOKER presents novelties in each the candidate choice, wherever a replacement metric that gathers the packet-delivery dependability of the links with the distance-progress towards the ultimate destination has been introduced, and therefore the candidate coordination, wherever 2 totally different procedures were enclosed, namely, ACK-based and timer-based coordination schemes. in addition, a dynamic adjustment of the protocol's control-message sending-interval was developed aiming at adapting JOKER to the particular network conditions and reducing energy consumption additionally. 2 totally different JOKER implementations, for simulation and experimental test-benches, were introduced and tested, permitting examination the performance of JOKER supporting video-streaming traffic thereupon bestowed by the outstanding ad-

hoc routing algorithmic program attender. From the earned results, the superior performance of JOKER as compared with attender was shown in terms of each QoE and energy potency.

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