A Review of Wireless Distributed Storage in Socially Enabled D2D Communications

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Abstract: Wireless distributed storage systems is able to potentially relieve the centralized traffic burden of base stations and above able to improve system reliability for data sharing in device-to-device (D2D) communications. Mobile devices [i.e., content requesters (CRs)] can not only download their desired contents from serving BSs, but can also get them from neighboring devices [i.e., content helpers (CHs)] with possession of the contents. If so, D2D links between CRs and CHs are not always stable, due to user mobility or direction changing and the time-varying property of all wireless links and structures. In this paper we are able to study related to the utilization of socially enabled D2D links to deliver the desired contents based on distributed storage. We are able to classify the success rate for downloading and reconstructing in device to device assisted networks subsequently, by analyzing statistic communal interaction information for potential D2D links.
Key Words:

INTRODUCTION:

The rapidly increasing number of cellular users and emergence of more diverse multimedia services have led to exponential growth of traffic load at the cellular base-stations (BSs). Device-to-device (D2D) communication has emerged as a potential efficient approach to reduce the heavy traffic burden on the BSs, because of its property of making direct links possible between mobile nodes in proximity. As a potential complementary solution for traffic offloading from BSs, the association storage system is inveigling more attention recently. Thanks to the increasing storage latitude of mobile devices, data files can be gathered in a distributed way and respective mobile devices themselves can act as stockpile servers Content caching based distributed storage has been raised as one popular approach to reduce peak traffic for centralized BSs and improve reliability, by storing popular contents closer to the end users.

PREVIOUS WORK:

D2D communication in cellular networks is the concept of hybrid network which consists of infrastructure-based and ad hoc networks. Earlier D2D was proposed just for relaying purposes. A basic research was done to address fundamental issue to share the spectrum resources between cellular and D2D communications. Based on spectrum sharing, D2D is classified into: in-band and out-of-band. In-band uses the cellular spectrum, out-of-band refers to D2D utilizing bands other than the cellular band. In-band D2D is further classified as overlay and underlay. Overlay means that cellular and D2D transmitters use orthogonal time/frequency resources, while underlay means that D2D transmitters opportunistically access the time/frequency resources occupied by cellular users.

COMPARATIVE ANALYSIS:

A. Network Coding for Distributed Storage Systems (2010) Dimakis, Godfrey, Wu, Wainwright, K. Ramchandran , studies how to create encoded practical in a distributed way while transferring data across the networks. Distributed storage systems give the reliable connection to abstracts through repetition spread over individually capricious nodes. Application synopsis includes data centers, coequal storage systems, and storage in the wireless networks. Storing data using an erasure code, in practical spread across nodes, requires less redundancy than simple replication for the same level reliability. Since the practical must be systematically replaced as nodes placed.

B. Device-to-Device Data Storage for Mobile Cellular Systems, (2013) Joonas ,Camilla,Olav, considers device to device based storage community that is involved of mobile users. Assuming that broadcasting data from a base station to a mobile user expends more energy than relay data between two mobile users, they show that it can be profitable to use redundant storage to ensure that abstract files stay accessible to the community even if some of the storing users leave the network and derives tractable closed-form equation stating when excessive should be used in order to minimize the expected energy consumption of data recovery. Authors find that replication is the preferred method of adding repetition as opposed to regenerating codes. Their findings are verified by computer simulation.

C: Living on the Edge: The Role of Proactive Caching in 5G Wireless Networks (2014),Ejder ,Bennis, Debbah, Examines two case studying to exploit the structural and social structure of the network. Firstly, in order to lighten backhaul congestion, authors created a mechanism where files are aggressively cached during off-brow demands based on file popularity and correlations among users and files patterns. Secondly, lightning social networks and device-to-device communications, we create a procedure that exploits the social structure of the network by anticipating the set of influential users to cache strategic contents and disseminate them to their social ties via device to device communications.

D:Hybrid Centralized-Distributed Resource Allocation for Device-to-Device Communication Underlying Cellular Networks

(2015)Maghsudi , Sławomir, this paper studies a resource allocation problem in a single-cell wireless network with multiple D2D users sharing the available radio frequency channels with cellular users. The basic idea of D2D communication is that pairs of appropriately selected wireless devices reuse the cellular spectrum to authorize direct communication links, provided that the adverse effects of D2D communication on cellular users is minimized and cellular users are given a higher priority in using limited wireless resources

E: Device-to-Device Communication underlying Cellular Communications Systems (2009) Pekka Chia-Hao, Klaus, Cássio, Carl, Klaus, Olav , Visa, In this paper authors propose to facilitate local peer-to-peer communication by a Device-to-Device (D2D) radio which operates as an underlay network to an IMT-Advanced cellular network. Authors propose a novel power control mechanism for D2D connections that share cellular uplink resources. The mechanism limits the maximum D2D transmit power utilizing cellular power control information of the devices in D2D communication. They also studied a single cell scenario consisting of a device communicating with the base station and two devices that communicate with each other. The results demonstrate that the D2D radio, sharing the same resources as the cellular network, can provide higher capacity (sum rate) compared to pure cellular communication where all the data is transmitted through the base station.

F: Redundancy and Distributed Caching in Mobile DTNs (2007),Mikko ,Ott, In this paper, authors investigate applying redundancy schemes to improve message delivery and content retrieval. Delay tolerant networking (DTN) allows send points to exchange information in networks where end-to-end path may not exist at any given time. In this opportunistic model, routing and forwarding functionality in intermediate nodes enables data transfer following the store, carry, and forward paradigm. Beyond plain message forwarding, the increasing amount of storage in modern devices enables nodes to hold messages for an extended period of time. This feature can then be utilized to create an opportunistic cooperative storage

G: Resource Management for Device-to-Device Underlay Communication(2013) Chen, Lingyang, Zhu as one of next-generation wireless communication systems,Third Generation Partnership Project (3GPP) Long Term Evolution (LTE) is committed to provide technologies for high data rates and system capacity. Further, LTE-Advanced (LTE-A) was defined to support new components for LTE to meet higher communication demands. Local area services are considered as popular issues to be improved, and by reusing spectrum resources local data rates have been increased dramatically. However, the unlicensed spectrum reuse may bring inconvenience for local service providers to guarantee a stable controlled environment, e.g., ad hoc network, which is not in the control of the base station (BS) or other central nodes. Hence, accessing to the licensed spectrum has attracted much attention.

H: Resource Allocation Scheme for Device-to-Device Communications Underlaying Cellular Networks(2013)Duong, Shin, Oh-Soon propose a method to properly choose the cellular user equipment (CUE) that shares the radio resource with D2D users to mitigate the interference from the cellular link to the D2D receivers. Numerical results show that by applying our method the reliability of D2D communication improves significantly without degrading the performance of the cellular connection.

I: A Distance-based Study for Device-to-Device Communication Underlaying a Cellular System (2012) Henrique de H. M. Barros, Márzio G. S. Rêgo, Evilásio O. Lucena, Tarcisio F. Maciel, Walter C. Freitas Jr. and F. Rodrigo P. Cavalcanti ,In this work, we provide a brief literature review on D2D communication, identify and discuss key issues

related to the potential benefits of D2D communication within a cellular system, as well as present a distance-based study for defining scenarios in which D2D communication can increase the overall system capacity.

J:Resource Sharing Optimization for Device-to-Device Communication Underlaying Cellular Networks, (2011), Yu,Doppler, Ribeiro, Tirkkonen considerd Device-to-Device (D2D) communication underlaying cellular networks to improve local services. The system aims to optimize the throughput over the shared resources while fulfilling prioritized cellular service constraints. Optimum resource allocation and power control between the cellular and D2D connections that share the same resources are analyzed for different resource sharing modes. Optimality is discussed under practical constraints such as minimum and maximum spectral efficiency restrictions, and maximum transmit power or energy limitation. It is found that in most of the considered cases, optimum power control and resource allocation for the considered resource sharing modes can either be solved in closed form or searched from a finite set. The results show that by proper resource management, D2D communication can effectively improve the total throughput without generating harmful interference to cellular networks.

Comparative Table:

Paper Parameter	Paper [1]	Paper [2]	Paper [3]	Paper [4]	Paper [5]	Paper [6]	Paper [7]	Paper [8]	Paper [9]	Paper [10]
Paper Name	Network Coding for Distributed Storage Systems	Device-to-Device Data Storage for Mobile Cellular Systems	Living on the Edge: The Role of Proactive Caching in 5G Wireless Networksr	Hybrid Centralized-Distributed Resource Allocation for Device-to-Device Communication Underlaying Cellular Networks	Device-to-Device Communication Underlaying Cellular Communications Systems	Redundancy and Distributed Caching in Mobile DTNs	Resource Management for Deviceto-Device Underlay Communication	Resource Allocation Scheme for Device-to-Device Communications Underlaying Cellular Networks	A Distance-based Study for Device-to-Device Communication Underlaying a Cellular Systema Cellular System	Resource Sharing Optimization for Device-to-Device Communication Underlaying Cellular Networks
Author	Alexandros G. Dimakis, P. Brighten Godfrey, Yunnan Wu,	Joonas Pääkkönen , Camilla Hollanti ∗ , Olav Tirkkonen	Ejder Baştuğ # Mehdi Bennis ?and Mérouane Debbah # ,	etareh Maghsudi and Sławomir Stańczak,	Pekka JÄNIS, Chia-Hao YU 2 , Klaus DOPPLER , Cássio RIBEIRO	Pekka JÄNIS, Chia-Hao YU , Klaus DOPPLER, Cássio RIBEIRO	Chen Xu, Lingyang Song, and Zhu Han	Quang Duong, Yoan Shin, and Oh-Soon Shin	Henrique de H. M. Barros, Márzio G. S. Rêgo, Evilásio O. Lucena, Tarcisio F. Maciel, Walter C. Freitas Jr. and F. Rodrigo P. Cavalcanti	Chia-Hao Yu, Klaus Doppler, C´assio B. Ribeiro, and Olav Tirkkonen
Domain Name	Data Mining	Data Mining	Data Mining	Data Mining	Data Mining	Data Mining	Data Mining	Data Mining	Data Mining	Data Mining
Algorithm	Parallale Algorithm	Selection algorithm	Filtering Algorithm	Efficient Algorithm	Optimal Algorithm	Forawording Algorithm	Resource Allocation Algorithm	Resource Allocation Algorithm	Mode selection algorithm	Optimization algorithm
Implementation Platform	Power control, code construction	signaling, synchronization, power control,	D2D communication	D2D transmition	Signalling Interaction of the threshold base power control schem	Facebook App, ITrust	D2D communication	D2D communication	D2D communication	D2D transmition
Techniques	1.Generalition of communication and rounting methods	1. Simple caching 2.redundant caching	1.Power control scheme 2.Threshold based power calculation 3.Beamforming	1.Machine learning techniques 2.resource allocation techniqus	1.Bounding and decomposition techniques	1.Novel power control mechanism	1. The distance-based resource allocation	1. resource allocation for D2D communication underlaying a cellular network	1. Underlaying a Cellular System	1.link adaptation technique 2. Sharing Optimization Underlaying Cellular Networks

Issues	1.CPU processing 2. Disk input output system performance	1.Storage problem	1.Self organization intercell interferanceco ordination	1. Qality of service gurantee	1. primary service	1. Do not define a new DTN forwarding scheme	1. Battery life	close proximity, with high signal-to-interferencepl us-noise ratio (SINR)	not allow any two among *UE1*, *D2D-Rx* or *D2D-Tx* to be placed at the same position at same time.	
Applicati ons	1.sensor network application	1.File distribution in mobile device	1.web-browsing application 2 multimadia application	1 energy efficiency 2 end 2 end delay.	1. join power 2 .spectrum resource allocation 3 traffic detecting application	1Mail. ,web, file database access	1.energy efficiency	increase the spectral efficiency and reduce energy consumption	improve the system performance.	1.improve local services 2.Optimum resource allocation and power control
Conclusio n	We presented a general theoretic framework that can de-termine the information that must be communicate d to repair failures in encoded systems and identified a tradeoff between storage and repair bandwidth.	In this paper we analyze Device-to-Device (D2D) com-munications underlaying a cellular network. We show that given proper power control and coordination mechanisms it is possible to have D2D connections that reuse cellular band and still cause only minimal interfer-ence to the cellular network. We propose a power control scheme for the D2D links	In this article, we discussed the limitations of current reactive networks and proposed a novel proactive networking paradigm where caching plays a crucial role. By exploiting the predictive capabilities of 5G networks, coupled with notions of context-awareness and social networks, it was shown that peak data traffic demands can be substantially reduced by proactively serving predictable users demands.	We studied an underlay D2D communicatio n system, and proposed a two-stage resource allocation strategy that takes the priority of cellular users into account, and relies on strictly limited information. In the first stage, centralized channel allocation is performed by using a graph-theoretical method. The method offers high flexibility for selecting the allocation criteria, for instance aggregate utility, fairness or QoS guarantee..	In this paper we analyze Device-to-Device (D2D) com-munications underlaying a cellular network. We show that given proper power control and coordination mechanisms it is possible to have D2D connections that reuse cellular band and still cause only minimal interfer-ence to the cellular network.	In this paper, we have assumed mechanisms for cooperative caching in mobile DTN nodes and investigated how different re-dundancy mechanisms impact communicatio n performance of mo-bile clients retrieving resources from an infrastructure network.	In this section, authors investigated resource allocation for device-to-device communicatio n underlaying cellular networks, in order to extend UE battery lifetime. The proposed resource allocation game was analyzed to have a Nash equilibrium that is Pareto efficient. We added pricing to the game to deal with externality, and proposed an auction-based resource allocation algorithm. The results also show that the proposed algorithm performs close to the centralized scheme, and much better than the random allocation	In this paper, we have studied resource allocation for D2D communicatio n underlaying a cellular network. Authors have proposed a new resource allocation scheme, in which the BS can select the best CUE to mitigate the interference from the cellular link to the D2D link. In addition, they have derived the outage probability of D2D link in a simple form, so that the BS only needs to have the location information of CUEs and use the outage probability in selecting the optimal cellular resource sharing with the D2D link.	In this article authors evaluated the possible scenarios where the D2D communicatio n mode should be used to improve the system performance. As a perspective for future works, Author intend to formulate a mode selection algorithm in order to increase the system data rate, but considering the requirements for power saving via power control algorithms	In this article, authors analyzed D2D communicatio n underlaying a cellular network. They considered selecting between a cellular mode, and orthogonal and non-orthogonal resource sharing modes where radio resources are shared between cellular and D2D communicatio n. With orthogonal sharing and cellular modes, we solved the optimum radio resource allocation between D2D and cellular connections in closed form, except for the cellular mode when constrained by a maximum transmit energy.

CONCLUSION:

In this work, we provided an extensive survey on the available literature on D2D communications in cellular networks. We categorized the available literature based on the communication spectrum of D2D transmission into two major groups, namely, inband and outband. The works under in band D2D were further divided into underlay and overlay. Outband D2D related literature was also sub-categorized as controlled and autonomous.

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