IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-6, Issue-12, Dec 2018 E-ISSN: 2347-2693

Multipath Content Transmission Mechanism Based Determining Cache Node Locations in CCN

K. Girija[1*], V. Vijaya Deepa[2]

[1,2]Muthayammal College of arts and science Namakkal-637408, Tamilnadu, India

Available online at: www.ijcseonline.org

Accepted: 10/Dec/2018, Published: 31/Dec/2018

***Abstract*:** In the point of internet users they give preference to content information, when compare to content information now current scenario gives more important to location based information. WSN face many limitations of cache techniques in terms of short communication range, reliability, security, privacy, mobility, poor processing capabilities, small storage and limited bandwidth availability. The services or data are offered to a broad category of users via the internet by the virtualization of the resources in the clouds. The tasks of the applications are executed after scheduling to proper machines and assigning with appropriate resources. The cache nodes which helps to find the user through fast and easiest way, reduce the hop count as an existing integer linear programming (ILP) problem when path of cache nodes destination to the user. So therefore ILP not able to solve in time, thought another method of approach have been introduced that is novel multipath routing transmission mechanism based on the network coding (MRNC). Quantitatively analysis of Proposed system Optimality of the shortest-path routing in Content-Centric Networking (CCN) in terms of application-level performance metrics. By using network coding technology, users Interest packet is divided into multiple child interest packet, and the content is divide and random linear codes and the content, thus the content is cache fragmentation. Content retrieval process is become into more child content. Proposed method more efficient to track paths, fastest short paths and reduce computation time comparatively integer linear programming (ILP).

Keywords: Information centric networking, network coding, energy efficiency, caching strategy

I. INTRODUCTION

Fast and fast growth of computing and communication technologies, have brought remarkable changes in computer networking. The type, size and complexity of the required network depend on the needs of an organization. In particular, the type of network depends both on the nature of transactions taking place in the organization and the geographical dispersion of the organization. Cache node determining is a type of parallel and distributed system consisting of a collection of interconnected and virtualized systems. Cache node is a kind of parallel and dispersed framework comprising of an accumulation of interconnected and virtualized frameworks.

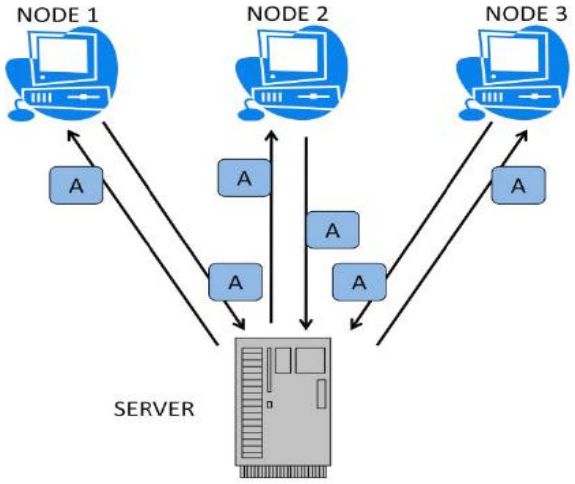

Fig.1. Example to show inefficiency of current internet architecture

Content centre network (CCN) is a kind of communication architecture for content sharing, and support efficient Content delivery. Cooperative caching plays a major role in improving information availability in any information sharing environment. As MANETs are deployed with cooperating mobile nodes without infrastructure feasibility, imparting cooperative caching in them is feasible. An ideal cooperative caching scheme should provide for an apt cache management scheme, an efficient cache sharing procedure and a good cache consistency mechanism. Data sharing based on content name and exchanging routing forwarding packets replace the traditional host address. CCN has some intrinsic characteristics, which make its have significant advantages in network security and deployment. The communication model was client server. Lately, numerous explores have been endeavored on cloud computing security, in light of the fact that few profits are there when the associations relocate into the network. The Content-Centric Network (CCN) architecture provides one example of how content name can be used to obtain.

This paper is framed as in section II explain content centric network details. In section III various existing system and related research work of Content centric Network architecture described in section IV. In proposed system caching MRNC algorithms for Content Centric Network (CCN) under the Section V. Finally section VI explains conclusions from the study results.

II. CONTENT CENTRIC NETWORK

Many applications of CCN are the results of intensive research carried out in various segments related to the scope of wireless ad hoc networks. Most of these research, aim at mitigating certain issues with an intention to enhance the overall accuracy of the network. The main expectation and interest of network users evolve around information access and information retrieval. The end users desire to access or receive their data of interest irrespective of their geographical location. Information access and information retrieval have paramount importance when CCN are used in commercial sector.

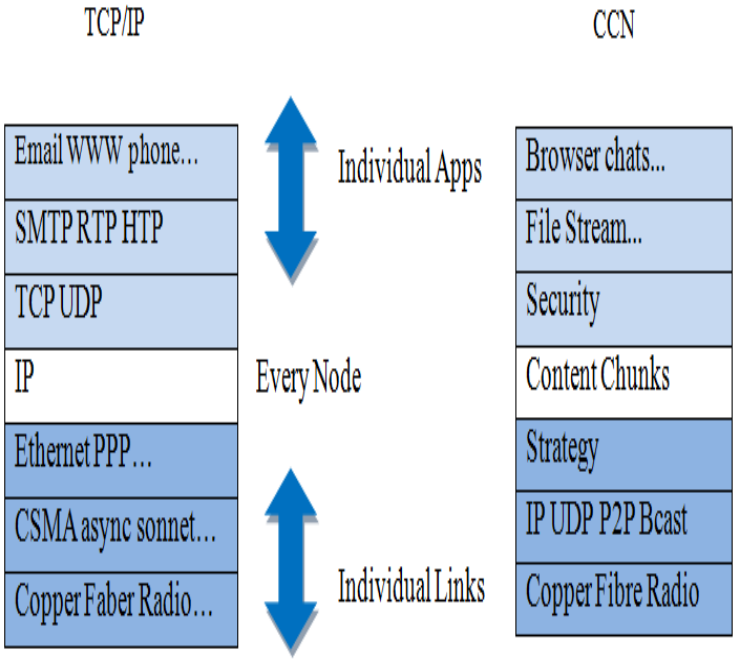

Figure 2: IP and CCN protocol stack

In CCN any communication is governed by client, not by the server. CCN basically supports pull based data transfer. Client will always receive contents which were already requested. This feature of CCN eliminates security threats which are possible in IP. In figure 2 explain the communication between TCP/IP to CCN. In IP along with requested content some unrequested thing may also be delivered to client.

Only the registered clients are updated frequently, thereby, avoiding unregistered clients from receiving the recently updated data. Figure 3 explain the content centric network pocket format transmission. This cache consistency mechanism ensures reduced bandwidth utilization, less query latency, besides decreasing the network traffic and the excessive load at the data server.

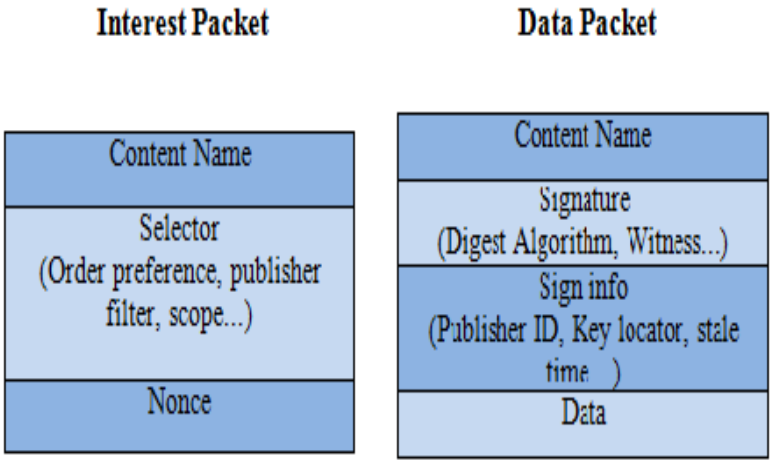

Figure 3: CCN packet format

III. LITRATURE REVIEW

Caching carried advantage of this multi-sink wireless communication that exists in networks. With data being coached by mobile nodes, a request can easily be served by neighbouring mobile node instead by the data source and thereby reducing mounting traffic towards the data source. However content centric network are constrained by limited energy, computation power and bandwidth which make caching a difficult task. To overcome these bottlenecks and still provide for caching many research works have been triggered in this direction. D.kim et al., (2015), W.K.chai., (2013), S. Wassermann., (1994), and K. Suksomboonyet al., (2014, march), proposed various replication schemes for mobile ad hoc networks. Here data replication in caches of content centric network nodes is discussed.

M. Xie et al., (2012) have proposed three cache schemes namely CacheData, CachePath and HybridCache. While data is cached in all the centralized sinks in the case of Cache Data scheme, all the centralized sinks cache the path of data acquisition in the case of Cache Path scheme. An Index Push (IXP) and Data Pull/Index Push (DPIP) protocols Y. Xu et al., (2013) have been proposed for inducing cache sharing in MANETs. In this symmetric approach, IXP protocol is used to share the cache contents of a node with other nodes in its zone. The DPIP protocol comes into action when a node needs to acquire the contents in the cache memory of a newly entered node. In IXP protocol, each node broadcasts an index packet, which contains information about caching events occurring in any node within the region.

S. Guha et al., (1998) gone for asymmetric caching approach. Here, two types of mobile clients are identified namely Low Activity Mobile (LAM) clients in which data items are replicated and High Mobility Mobile(HMM) clients that make use of these replicas. The classifications of nodes are based on mobility pattern of individual nodes and their data access pattern. Group based COCA employs clustering over LAMs and HMMs and in this approach certain nodes are employed as heads to maintain state information.

In other techniques to Network coding(NC) is first put forward by Ahlswede et al.,(2000) in the network information flow paper as in , Basic thought is to merge data packets, allows the nodes to code data flow again in network. Using this NC technology makes network multicast transmission achieve network multicast capacity.

Several studies have shown that in the real network, the network coding system shows more advantages in throughput, robustness, security and load balance than traditional without network coding system. Wang et al., (2014) Analysis the SDN based framework for cache management in ICNs with linear network coding. Yang et al Reference made network coding apply in peer-to-peer file sharing. Propose two consistency policies namely, server initiated consistency policy and client initiated consistency policy.

Server initiated consistency policy is based on the push mechanism and here, the server and the caching nodes engage themselves in pushing recent updates on data of interest to the registered clients. On the other hand, client initiated consistency policy relies on a request-response pull mechanism for retrieving data of interest.

Recently, the network coding has been widely used in the wireless network. Yang et al.,(2014) referred a network coded caching-aided (NCCA) different cast scheme as in. Random network coding is an important application of hybrid random network coding in wireless network routing protocol, in order to improve the throughput of wireless networks as in zhang et al.,(2009) modal. However, few studies have network coding deployment in CCN. The challenge is how to provide linearly

independent encoding content block for the requester, simultaneously ensure the reliability of data transmission.

IV. PROPOSED SYSTEM

As for multipath routing transmission mechanism based on network coding is deployed in CCN, so data source node changed the traditional multipath method. It is not to multipath routing transmitting each data packet. But using network coding technology, segment some data message that are match of the user interest message S into coding block c and c '(as shown in figure 2), then to Content store (CS) in intermediate nodes along multiple paths. Finally the user terminal obtained Content message S by decoding the c and c'. When users move, and send a request S in the new position, it can be approached from nearly different cache of multiple paths to decode content message S.

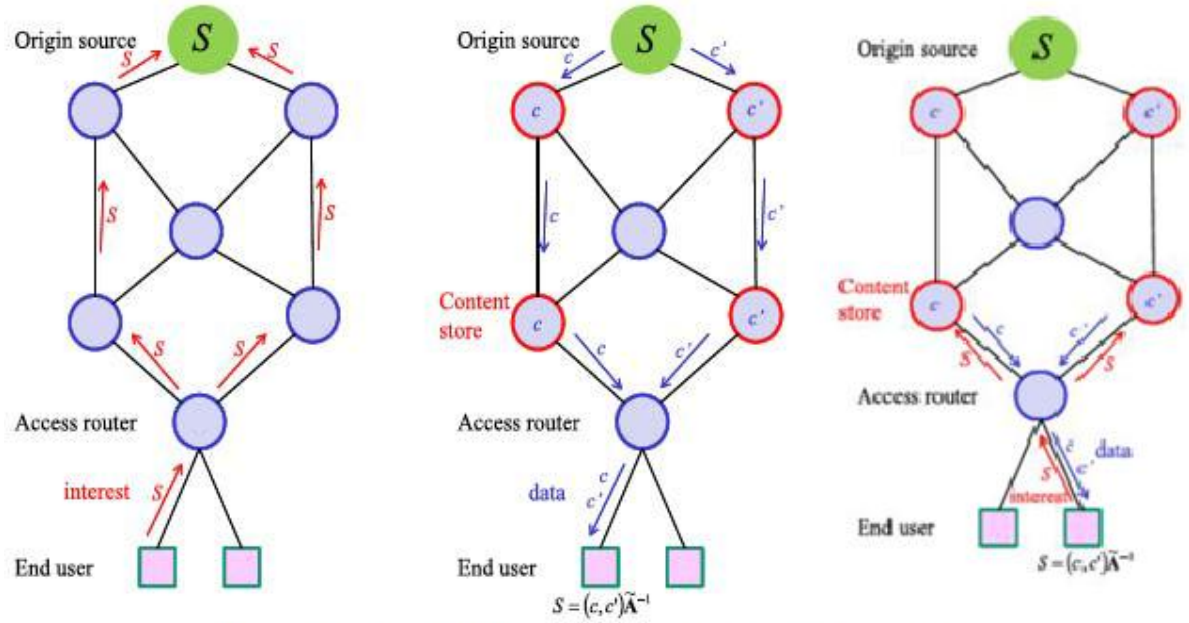

Figure 4. Multipath Routing Transmission based on Network Coding

Through reference [9]-[10], this paper adopted three indexes, successful Delivery Ratio (SDR), Total Redundancy (TR) and Transmission Efficiency (TE), to evaluate the model. After the original packet is divided into K packets, through random linear encoding generated K` packets (K'>K). Assuming that the original packet length is L bit, the header length is S bit. Encoded packets include group identity and 2 bytes coding vector. So the encoded data packets length represents as L` = L/K + S + 2 x 8. Suppose that two nodes transmit packets every bit error rate marked as θ, so the probability of successful received packet that node j of the path remember as Pi, j. The equation (1) can be said as follows:

$$P_{ij} = P_{ij-1}{}^{\times}(1-\theta)\,L \qquad \text{----- (1)}$$

Destination node at least received correctly K ($1 < K \geq k$) packets, through k disjoint paths to reach. Probability of successful recovery data of the first λ destination node record as ϕ. It can be calculated as in (2).

$$\varphi_{\aleph} = \sum_{\aleph-k\theta}^{k} C_k^K (1-\theta)^{lk} (1-(1-\theta)^l)^{k-k} \qquad \text{----- (2)}$$

In this case, the probability of a successful transmission is calculated as in (3).

$$SDR = \prod_{\aleph-1}^{n} \varphi_{\aleph} \qquad \text{----- (3)}$$

Therefore, m destination nodes, through k paths, received correctly K packets success-fully, total network redundancy record as TRK; it is shown in (4).

$$TR_k = k\left(\frac{mKL}{SDR} - ML\right) \qquad \text{----- (4)}$$

In order to better evaluate its performance, it is need to compare network transfer efficiency TE.

M destination nodes are going to transmit m times. K packets transmission efficiency TE is calculated as shown in (5).

$$TE = \frac{(SDR)^K}{m} \qquad \text{------- (5)}$$

Figure 4 explain the sources multi routing transmission protocol sources and flow diagram of various router nodes

V. RESULT AND DISCUSSIONS

In this section, the performance of our system (MRNC) and compare it with ILP schemes in various data transmission layer. System considered 2 different cache proxies levels. Because at level 2 has less mobility costs than those at level 1 Moreover, we also observe that when the Distance increases

from 6 to 8, the mobility costs increase. This happens because the proxies that the mobile subscriber is currently connected to are farther than those proxies that the mobile subscriber was connected to at the previous time instance.

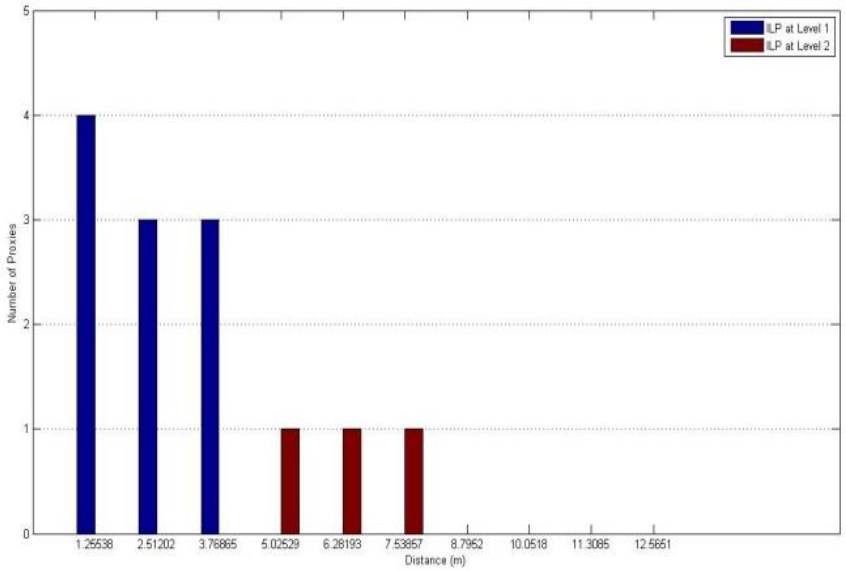

Figure 5: ILP method analysis of distances and the number of caches in different levels

Above the figure 5 distances based existing ILP method to communications at various sinks. The existing algorithm introduces the different number of hops in network 1 and network 2. And result describes the two different levels of caches used to find distance of levels of pixels.

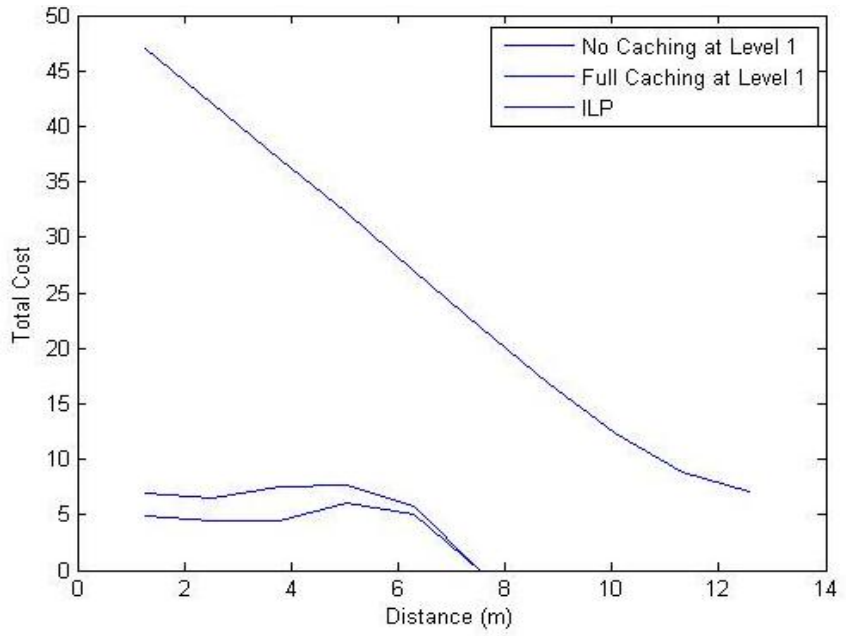

Figure 6: ILP method Mobility Cost over Distance

Figure 6 total cost variation of three modes of function without cache, full of cache and after existing MRNC method applied two different Levels to nodes in distance and cost variation graphs this result of this graph level 2 (MRNC2) total cost is less compared to other methods.

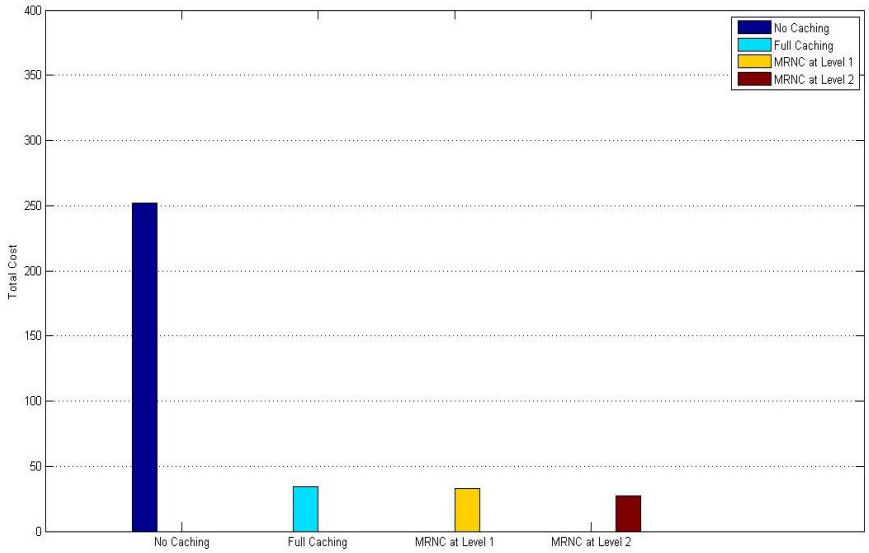

Figure 7: Proposed MRNC analysis of distances and the number of caches in different levels

Figure 7 total cost variation of three modes of function without cache, full of cache and after existing MRNC method applied two different Levels to nodes in distance and cost variation graphs this result of this graph level 2 (MRNC2) total cost is less compared to other methods.

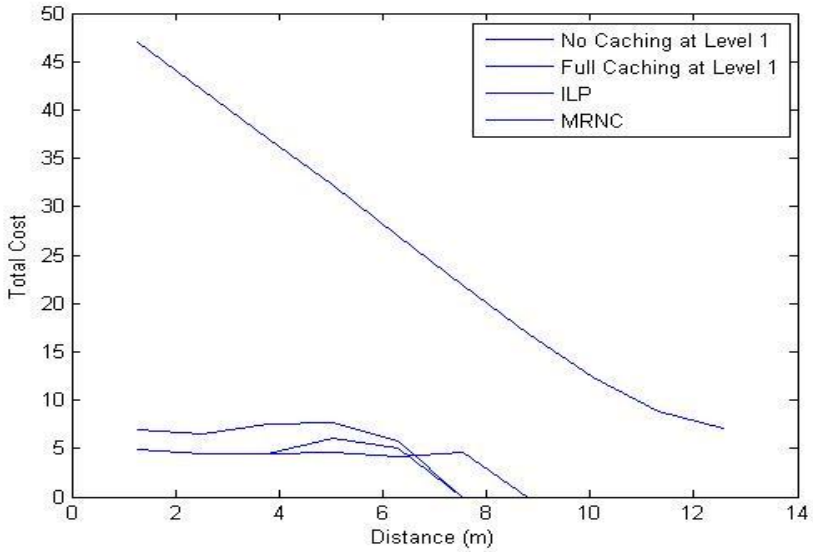

Figure 7: MRNC and ILP Mobility Cost over Distance compression

In figure 8 represents the differentiate the various network data in proposed MNC and existing ILP methods these considered as two parts like no caching at level 1 and full caching level 1 modes. Thus shows that the MRNC approach better to reduces the computation time and total cost compared with the ILP approach. Proposed system not only increase the reliability of network transmission, but also improve the successfully delivery rate SDR, transmit efficiency TE, and reduce network total redundancy TR. Simulation experiment results show that, network coding has great advantage in CCN. At the same time, multiple paths routing protocol has made a contribution for CCN.

VI. CONCLUSION

CCN being promising techniques for the architecture of the Future Internet, it is important to address its mobility in face of increased delay when considering real-time applications with strict delay requirements. Existing ILP method consume the long time to solve huge network problem, we introduced the approach of using multipath routing network

coding MRNC. Finally, based on the analysis of performance results mentioned above, our main findings are: the MRNC generates the additional amount of cached content items with respect to caching. However when considering an application that requires a fast handover (e.g. Online gaming in which seamless experience is desired), the MRNC is more appropriate than the caching.

REFERENCES

[1]. D. Kim, S. W.Lee, Y. B. Ko , Jae-HoonKim, (2015, April) Cache capacity-aware content centric networking under flash crowds, Journal of Network and Computer Applications, Vol:50, , PP-101-113.

[2]. W. K. Chai , D. He, I. Psaras, G. Pavlou., (2013) Cache ''less for more'' in information-centric networks. (extended version), Computer Communications, Vol. 36. PP-758–770.

[3]. S. Wassermann, K. Faust., (1994) Social Network Analysis: Methods and Applications, Cambridge University Press, Cambridge.

[4]. K. Suksomboony, S. Tarnoiz, Y. Jiyz, M. Koibuchiyz, K. Fukudayz, S. Abeyz, N. Motonoriyz, M. Aokiyz, S. Urushidaniyz and S. Yamada., (2014, March) PopCache: Cache More or Less Based on Content Popularity for Information-Centric Networking, IEEE Conference on Local Computer Networks.

[5]. M. Xie, I. Widjaja, H. Wang., (May 2012) Enhancing cache robustness for content-centric networking, IEEE INFOCOM. Orlando, USA.

[6]. Y. Xu, Y. Li, T. Lin, G. Zhang, Z. Wang, S. Ci., (2012, March) A Dominatingset- based Collaborative Caching withRequest Routing in Content Centric Networking, IEEE International Conference on Communications (ICC), pp.3624 – 3628.

[7]. S. Guha and S. Khuller., (1998) Approximation algorithms for connecteddominating sets", Algorithmica, Vol-20(4), pp-374–387.

[8]. Ahlswede R, Cai N, Li S-Y, Yeung R.,(2000) Network information flow. IEEE Trans Inf Theory," vol. 46, pp. 1204–1216.

[9]. Wang J, Ren J, Lu K, Wang J, Liu S, Westphal C., (2014) An optimal cache management framework for information-centric networks with network coding, In: 2014 IFIP networking conference. Trondheim, Norway, pp. 1-9.

[10]. Yang M, Yang Y., (2014) Applying network coding to peer-to-peer file sharing, IEEE Trans Computer, vol. 63, pp. 1938–50.

[11]. Zhang X, Li B., (2009) Optimized multipath network coding in lossy wireless networks. Selected Areas in Communication, IEEE Journal on. vol. 27, pp. 622-634.

