Fast Response and Energy Efficient Caching Policy for Information Centric Networking with Flexible User Mobility

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***Abstract*— In this research we propose a moderate caching policy, in which the most popular or most requested data will be stored in lower level access point routers of network. Data will be sorted as name-wise that reduces the searching time. Due to reduction of searching time, the power consumption is substantially reduces and the user will get fast response. Moreover, our new architectural design will improve the mobility to user. If users change the position after requesting data, the users may loss the lower level access point routers connectivity. But In new star network topology the user can get the data from every side's lower level access point routers. That increases the possibility of get popular data in the other lower level access point routers in the same network. This may help users to get desired data in shorter time. There for the mobility will be increased. We also design the network for YouTube. Most naturally, when client requests for data in YouTube, then data comes from the server. But we assume that if user can get the data from intermediate node then link utilization will be optimized and power will be saved, response time will be shorter and node data will be performed as backup.**

Keywords*— *Energy Efficiency, User Mobility, Fast Response, Future Internet (FI), Information Centric Networking, Adaptive Link Rate (ALR), Name Data Networking (NDN)

I. INTRODUCTION

IP based networking system is used host centric networking. In IP based system, users request for data and get response from the host directly. So the user needs to traverse the whole paths. For that the link utilization is low and the user and host information doesn't hide in IP-based system. A hacker can steal information from the link [1] in this IP-based system. We know that, IoT will be future technology will use huge amount of data that are heteronomous data. That will be a problem in IP based networking system. This different problem can be solved in Information Centric Networking (ICN). ICN is a candidate for future internet technology [2] using name-based routing. It stores data in router cache and uses inter-networking schema. When user sends request for a data, and if it gets data from any intermediate node, it sends data to user. Here the actual host and user information do not need. So user and host information is hidden. Main goal of ICN is to save power and utilize the network link [3]. In traditional ICN data is stored in every node. But data stored in every node is not clever technique. This technique wastes huge data storage and energy. Different researches conduct previously used idle and full mode to reduce the power [4], and also used different levels of node. Where it stores most popular data in lower level access point nodes, for that it reduces the link rate [5]. For these different reasons in future the new ICN networking technology will be used broadly. But in those researches the link rate and power consumption are not enough. Power consumption and link rate may reduce. And the mobility may big issue for the existing models. And here will also propose an ICN based YouTube network schema for future network system.

In our proposed model to get fast response and to reduce the power consumption we assume that the popular data will be stored in lower level access points (routers) and sorted in name-wise. To reduce the link rate, data will be categorized as popular and non-popular and sorted form. Response time will be faster and optimized this process. To reduce power consumption router will be in idle or full working mode. To increase mobility moderate star system architecture will be used.

II. RELATED WORK

A. *CONTEXT-AWARE ALR AND GREEN NETWORKING*

In [5] green networking writer is proposed that the power consumption of the network system is reduced. In regular structure of ICN consumes huge power because of data storage in different nodes. And link rate is high. Q. N. Nguyen [5] used to store data as popular and no-popular in different levels for reducing the link rate and the power consumption. Some specific data are used maximum time and users frequently request for those data. In this case if the mostly used data is store in lower level access point routers, if a user request for data then they can get data in lower level access points. This process optimized the link utilization. At the same time most of the data are not popular. If non popular data store in every node levels then it may cause of wastage of data storage and may causes of long time to find the data. In different researches, rate-adaptivity and sleeping mode is used for reducing the power consumption of network system. In this mode when a packet request is come in router then it will be active. If packet request not come then it will be in idle mode. Using this scenario the power consumption will be reduced. The ALR (adaptive Link Rate) is mainly used in IP based network system but here writer wants to get scope from it in FI (Future Internet) architecture to reduce to power consumption by using proactive-caching mechanism and smart scheduler [6-7]. Most of the time in ALR binds the low rate of data. About 80 percent of time need not high data rate. Using this mechanism actually reduce the power consumption of the system.

B. *MOBILITY IN ICN*

Fifth generation (5G) networking will maintain huge amount of data. It is big issue to handle the large amount data. Jordan Augé [7] wants to say its mobility also another big issue. People may change the location frequently, for that mobility is big concern in 5G. IP based networking system will not give more flexibility like ICN. In IP bases networking system the same mobility feature may more complex. The power consumption and link rate will be increased. S. Adhatarao [8] wants to say that 5G and IoT technology are increasing rapidly. Here the mobility is a big issue because the user will traverse from node to node. Here the want to show how to reduce the network traffic. Our proposed Energy Efficient and Flexible Mobility Model for ICN Here we want to express energy efficient network model for ICN in wireless LAN network.

III. PROPOSED FAST RESPONSE AND ENERGY EFFICIENT MODEL

A. *WIRELESS NETWORK TOPOLOGY OF PROPOSED ICN*

We thought that, here star topology will be used because of flexible user mobility. People can get data from every sides of the network. If user will change the position, then she/he can easily get the data from the same network and has higher possibility to get popular data at the lower level access points in the same network.

In **Fig-01** we see the network system structure. Total M servers in the root level will be the main Content Provider (CP). And total N Content Nodes (CN) disperse in different levels in the network. CN has two types (1) Content Router (CR) and another is (2) wireless Access Point (AP). Here we assume the every AP has caching function. CN acts as an NDN node [10]. CPs will stay in root level and the CNs at lower level of the network. All content items will be stored in the root level of the network. Where all content items set C and c is the different content item ($c \in C$).

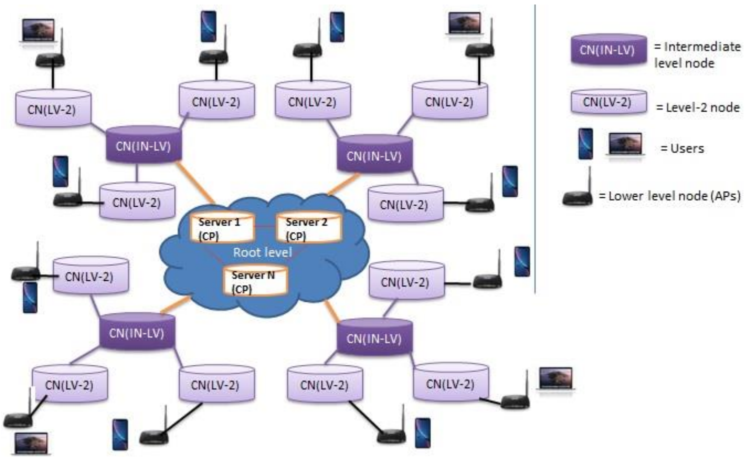


Fig-01: Network topology for the proposed system

When wireless users will request for data then they will connect via Wi-Fi AP at lower level Access point routers of network, this is the first level. If user cannot get the desired replica of data at lower level CNs, then request message will be forwarded at the root level CPs this server. We assume that every AP has the same radius.

Our main thinking in this proposal, we assume the star network structure for flexible mobility. Suppose a user requests for data then device firstly connects to a first level APs. In the lower level access point's most popular data are stored. So that the replica of most popular data may find in the lower levels, if that not possible then request will be processed in upper level server. When, user changes position and side, then how to connect with APs in tree topology [5], because very APs have limited coverage area. This is a problem for the mobility of mobile devices. For this reason, we assume the star network topology. If any user will change the position then she/he can get APs coverage from every sides of same network. And also has a possibility to get same replica of popular data content at lower level in same network. This increases the mobility of the system.

B. ADAPTIVE OPERATING SYSTEM AND SORTED DATA

Both of CRs and Wireless APs in CNs will store data using ALR technique [5]. Using this technique the link rate is used when it needs. These techniques reduce the operation power of the system. For that, the power consumption of regular ICN system is reduced and lowers than the IP based system. Link rate is optimized using the popularity levels of contents. And the data will be sorted form in every CNs, this reduce the searching time in our proposed system. For this reason the operating power will be reduced and the power consumption will be reduced.

TABLE-01: NOTATIONS USED IN PROPOSED SYSTEM

Notation	Meaning
P_k	The probability of content c ϵ C can find in level-k in CN
Q_k	The probability of a user will traverse total k levels of topology (1<= k <= L)
R_k	The incoming link rate to a level-k CN
S	Maximum number of content objects will be stored in CN cache
T_p	Threshold value of P1 for all content c ϵ C to classify popular and unpopular content
R_{ICN}	The link rate capacity in the conventional ICN design
β	Ratio of CNs which support ALR function (when β=1, CN operating power is ideally proportional to link utilization)
S_k	The set of all distinguished content items that users send interest packets to level-k CN
Optimized R_{ICN}	The adjusted value of R_k in proposed ICN model to minimize CN operating power
$P_{R2\text{-}ICN}$	Operating power consumed by a CR in conventional ICN
$P_{R2\text{-}ICN,k}$	The value of operating power consumption of a CN at level-k in proposed ICN model
$P_{R2\text{-}AP,base}$	Base power consumption of AP (fixed)

In **Table -01** we see P_k has the same values in same layer. More popular content has higher interest rate so that it will highly dense in lower level of network. IP based system user need to traverse total way from access point to server i.e., $p_k = 0\ \forall\ k \in (1,2,\ldots,L)$ and $p_{L+1} = 1$.Then,

$$Q_k = P_{k+1}\prod_{l=1}^{k}(1-pl) \qquad (1)$$

Maximum popular content will be stored in 1st level, so R_k is high for the lower level i.e., $R_1 > R_k$ where 1<k<= L. If c has $p_1 >= T_p$, then the content is popular otherwise non-popular content. Popular content transmitted using high link rate and traverse lower distance than the no-popular contents. When a user requests in APs then the router adjust the link rate in lower levels as follows:

$$New\ R_{1,ICN} = (1-\beta)R_{ICN} + \beta(R_{ICN}\frac{P1}{Tp}) \qquad (2)$$

When user requests for the non-popular contents then the new optimized values will be as follows:

$$Optimized\ R_{1,ICN} = (1-\beta)\ R_{ICN} + \beta\ \{\ R_{ICN}(\frac{\max P1c}{Tp})\}$$

$$\forall \text{ Content } c \in S_1 \text{ and } |S_1| <= S \qquad (3)$$

If user has minimum one request for the popular content in lower level APs. Then the equation will be,

$$Optimized\ R_{1,ICN} = R_{ICN} \qquad (4)$$

R_k (1<k<=L) is adapted for optimizing operating link utilization of ICN system routers. For that, optimized link rate minimizes the operation power of the system. So,

$$Optimized\ R_{k,ICN} = (1-\beta)\ R_{ICN} + \beta\ [R_{ICN}\{1-\min\ (P_{1c} + \textstyle\sum_{l=1}^{k-2} Qlc\ )\}] \qquad (5)$$

For the only non-popular content:

$$Optimized\ R_{k,ICN} = (Optimized\ R_{1,ICN}) \times [1-\min\ (P_{1c} + \textstyle\sum_{l=1}^{k-2} Qlc)]$$

$$\forall \text{ Content } c \in S_k \text{ and } |S_k| <= S \qquad (6)$$

$P_{R2\text{-}ICN}$, is the operating power for the CRs in regular ICN system model. If CRs is maintains ALR function then the optimized value can be written as,

$$Optimized\ P_{R2\text{-}ICN,k} = \{(Optimized\ R_{k,ICN}) / R_{ICN}\} \times P_{R2\text{-}ICN} \qquad (7)$$

AP power consumption is fixed in though it is an idle state [11]. For this reason in the situation in non-popular content, if the $P_{R2\text{-}ICN,1} < P_{R2\text{-}AP,base}$ then the equation will be,

$$P_{R2\text{-}ICN,1} = P_{R2\text{-}AP,base} \qquad (8)$$

So in both of traffic load and content popularity level the ALR minimizes the power consumption of CRs.

C. ENERGY EFFICIENT AND FAST RESPONSE CACHING POLICY

We will discuss here power effective caching policy for ICN. Where content will be stored based on priority and popularity levels. Here our main invention of sorted data storing policy may reduce the power consumption and response time of system.

- *TYPES OF CONTENT*

In ICN caching policy there have two types of contents: a) emergency content and b) non-emergency content. As the networking connection may loss or other cause can occur for that the content may unavailable so, emergency content has always higher priority. And always be stored in cache.

Father non-emergency content may two types a) popular content and b) non-popular content. Popular content has higher density than non-popular ones in caching system. In [5] they use a binary bit 0 and 1 to indicate the emergency and non-emergency content and assign as the following format structure (FIGURE 02):

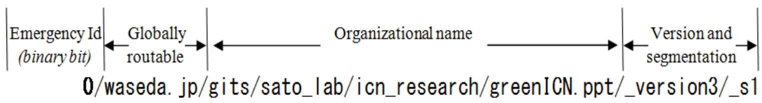


Fig. 02: Content Name with Emergency Identifier.

- *CACHING THE DATA IN SORTED FORM*

In this section we proposed a new caching policy in ICN that, when data will be stored in ICN cache. Here a new caching policy will be maintained. Data has a name in NDN system. So, when data will be stored should be maintained an alphabetical sorting order (in **Fig. 03**). This will very helpful when a user search for specific data content. When a data come then it will be stored in a array with the first letter of the data name like **arab.jpg** will be stored array A[++i]. When next data will come then system increase the memory location pointer and store the data. And this work will be done when the node is in operating mode to serve the user request. So no extra power is needed. Furthermore the searching procedure will be faster because it is sorted data. So we can easily find using binary search. So, due to reduction of operating time, power consumption will be reduced.

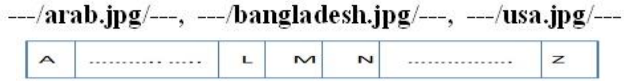


Fig. 03: Proposed Sorted Content Caching Style.

D. MODARATE OPERATING MODE

There has the two operating mode 1) Full mode (F) and 2) Idle mode (I). For reducing the energy consumption of the server those modes are made. When the server in F mode that will consume 100% percent of energy. And if in I mode then use lower energy (about 40%) than the F mode. When idle mode and when full mode will be activated this has a condition. The interest traffic transmits time from AP to server T, and Δt is inter-arrival time between two consecutive requests. If $\Delta t > T$ then the server will be in I mode. Otherwise the server will be in F mode. This mechanism reduced the consumption power of the system.

IV. MODERATE ENERGY EFFICIENT POWER CONSUMPTION MODELS

At first we will formulate a mathematical model before discuss energy consumption. We will formulate the energy consumption model of the systems referred to our paper study [5], [4], and [12] as the basis. The energy consumption of the system is measured by the total summing the energy consumption of all the system elements. We assume that each network system has two basic elements that are 1) N content nodes (CNs) and 2) M content provider (CPs). We do not consider the mobile user's power consumption but we will cover in our future.

A. IP-BASED SYSTEM ENERGY CONSUMPTION MODEL

Firstly we want to model the energy consumption model for IP-based system as follows,

$$E_{IP} = N*E_{R\text{-}IP} + M*E_S = N*P_{R1\text{-}IP}*T_W + N2*P_{R2,AP\text{-}IP}*T_W + M(P_{S1}*T_W + P_{S2}*T_W + P_{S3}*T_W)$$
$$= T_W(N*P_{R1\text{-}IP} + N2*P_{R2,AP\text{-}IP}) + M*T_W(P_{S1} + P_{S2} + P_{S3})$$
$$= T_W\{N*P_{R1\text{-}IP} + N2*P_{R2,AP\text{-}IP} + M*T_W(P_{S1} + P_{S2} + P_{S3})\} \quad (9)$$

Where, $E_{R\text{-}IP}$ = Energy consumption of IP-based router, E_S = Energy consumption of router. $P_{R1\text{-}IP}$, $P_{R2\text{-}IP}$, and $P_{R2,AP\text{-}IP}$ are the embodied power of a network node (router/AP), working power of an IP router, and working power of an AP, respectively; N1 and N2 are the number of routers and number of APs ($N1 + N2 = N$) and $PS1$, $PS2$ and $PS3$ are the embodied power, power for server storage, and operating power of a server (same value for both ICN and IP-based network system), respectively. Besides, Tw is the working time of the whole network system.

B. ICN SYSTEM ENERGY CONSUMPTION MODEL

General ICN system energy consumption is higher than the IP-based networking model because in ICN system has caching function but server power consumption remains same. Energy equation for simple ICN system is,

$$E_{ICN} = N*E_{R\text{-}ICN} + M*E_S = N(P_{R1\text{-}ICN}*T_W + P_{R3\text{-}ICN}*T_W) + N_1*P_{R2\text{-}ICN}*T_W + N_2*P_{R2\text{-}ICN,AP}*T_W + M*E_S$$
$$= T_W\{N(P_{R1\text{-}ICN} + P_{R3\text{-}ICN}) + N_1*P_{R2\text{-}ICN} + N_2*P_{R2\text{-}ICN,AP}\} + M*E_S \quad (10)$$

Where $P_{R1\text{-}ICN}$, $P_{R2\text{-}ICN}$, and $P_{R3\text{-}ICN}$ are the embodied power, working power, and power to cache memory of a CN (CR/AP), respectively.

C. GREEN ICN SYSTEM ENERGY CONSUMPTION MODEL

Energy consumption for previous green ICN based system that reduced the power than general ICN and IP-based system architecture. Because here used ALR technique. The equation,

$$E_{ICN\text{`-}GREEN} = \sum_{k=1}^{N}.(Optimized\ E_{R\text{-}ICN,rk}) + \sum_{j=1}^{M}.(Optimized\ E_{S\text{-}ICN,Sj}) \quad (11)$$

Where optimized energy consumption of green ICN based system:

$$\sum_{k=1}^{N}.(Optimized\ E_{R\text{-}ICN,rk}) = N(P_{R1\text{-}ICN}*T_W + P_{R3\text{-}ICN}*T_W) + \sum_{k=1}^{N}(Optimized\ P_{R2\text{-}ICN,rk}*T_{ork}) + \sum_{k=2}^{N}.(Optimized\ P_{R2\text{-}ICN,rk\text{-}1}*T_{d1}) + \sum_{k=1}^{N}.(P_{R2\text{-}ICN,AP\text{-}base}(T_W - T_{or1i})) \quad (12)$$

And optimized energy consumption of the cluster of M servers (CPs):

$$\sum_{j=1}^{M}.(Optimized\ E_{S\text{-}ICN,Sj}) = M(P_{S1}*T_W + P_{S2}*T_W) + \sum_{j=1}^{M}.(Optimized\ P_{S3,Sj}(T_{Osj} + x_{sj}*T_{d2})) \quad (13)$$

where T_{ork} is the operating time of router rk (router at level k of topology) with ALR design, and T_{Osj} is the operating time of the server S_j with optimized power mode, T_{d1} and T_{d2} are transition times between successive link rate changes and CP operating mode switches, respectively. In addition, x_{sj} is a binary variable that indicates whether the next optimized operating mode of a server S_j is different from its current optimized mode: If the optimized mode does not change after period T then x_{sj} takes value of 0. Otherwise, its value is 1. Hence, there is an additional incurred energy consumption for switching between different network device operating modes or rate switches.

D. ENERGY CONSUMPTION MODEL FOR OUR PROPOSED SYSTEM

We have proposed that, the data will be cached as sorted form in every router and server. Because the data unify as name-wise so it is possible easily. And here need not extra or very low power consumption in sorting time because when the content come to a specific router the router may have in operating mode so extra power need not to sorting the data. And when a request is come then the router can apply binary search algorithm that may reduce the power. So our proposed mathematical model will be like that for average case,

$$E_{ICN\text{`-}pro} = \sum_{k=1}^{MN}.(Pro\ E_{R\text{-}ICN,rk}) + \sum_{j=1}^{M}.(Pro\ E_{S\text{-}ICN,Sj}) \quad (14)$$

Where optimized energy consumption of green ICN based system:

$$\sum_{k=1}^{N}.(Pro\ E_{R\text{-}ICN,rk}) = N(P_{R1\text{-}ICN}*\log_2(T_W)) + P_{R3\text{-}ICN}*\log_2(T_W\sum_{k=1}^{N}.(Pro\ P_{R2\text{-}ICN,rk}*\log_2(T_{ork})) + \sum_{k=2}^{N}.(Pro\ P_{R2\text{-}ICN,rk\text{-}1}*T_{d1}) + \sum_{i=1}^{N}.(P_{R2\text{-}ICN,AP\text{-}base}(\log_2(T_W) - T_{or1i})) \quad (15)$$

And optimized energy consumption of the cluster of M servers (CPs):

$$\sum_{j=1}^{M}.(Pro\ E_{S\text{-}ICN,Sj}) = M(P_{S1}*\log_2(T_W) + P_{S2}*\log_2(T_W)) + \sum_{j=1}^{M}.(Pro\ P_{S3,Sj}(\log_2(T_{Osj}) + x_{sj}*T_{d2})) \quad (16)$$

V. RESULT AND ANALYSIS

Q. N. Nguyen [5] claims Power consumption of F mode and I mode is 100% and 40% respectively [8]. T_{d1} and T_{d2} used value are 0.1ms. The hot caching is 70% and cold caching is 30% in content node cache. In cold cache 15% data are non-popular. And network elements size and respective power consumptions in bellowing table:

TABLE 02. NOTATIONS USED IN PROPOSED SYSTEM

Network element	Power consumption (W)
$P_{R1\text{-}IP}$, $P_{R2\text{-}IP}$, $P_{R2,AP\text{-}IP}$	13, 116, 10.2
$P_{R1\text{-}ICN}$ 64, 96, 128, 192, 256 GB	13.5, 14, 15, 15.5, 16
$P_{R2\text{-}ICN}$ 64, 96, 128, 192, 256 GB	119.6, 120, 120.2, 120.4, 120.6
$P_{R2\text{-}ICN,AP\text{-}base}$ 64, 96, 128, 192, 256 GB	12.4, 13, 13.4, 13.6, 13.8
$P_{R1\text{-}ICN,AP\text{-}max}$ 64, 96, 128, 192, 256 GB	13.3, 13.9, 14.3, 14.5, 14.7
P_{S1}, P_{S2}, P_{S3} (for each 10 TB), $P_{R3\text{-}ICN}$	68, 20, 731, 0.053

We simulated in the **figures** (from 04 to 06) Horizontal (X) axis indicates cache size in (GB). And Vertical (Y) axis indicates power consumption (KW). And also we assume $N1$=10; $N2$=15; T_w=10s; T_{d1}, T_{d2}=0.1ms.

A. POWER CONSUMPTION ANALYSIS AND COMPARISON OF IP-BASED AND GENERAL ICN NETWORK

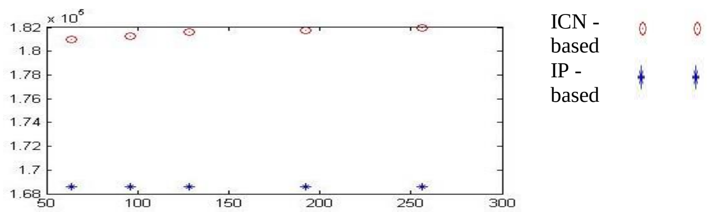


Fig. 04: Power consumption IP-based vs general ICN system

Based on (eq[n] 9 and 10) we see in **Fig. 04** that, power consumption of general ICN is higher than the IP-based networking system because ICN has extra caching function. And server site power consumption is same.

B. POWER CONSUMPTION ANALYSIS AND COMPARISON OF IP-BASED, GREEN ICN AND PROPOSED ICN NETWORK

Based on (eq[n] 9,11 and 14) we see in **Fig. 05**, that power consumption of green ICN is lower than the IP-based networking system. And our proposed system has lower power consumption that the green ICN system.

So, we can say that our proposed ICN network structure is less power consumption than other ICN-based or IP-based architecture. And get more mobility than other structure. Because green ICN use ALR policy and proposed model store data sorted. So power consumption is reduced.

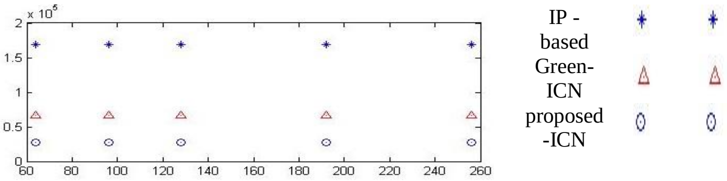


Fig. 05: Power consumption of IP-based Vs green ICN vs proposed ICN system

C. POWER SAVING RATIO OF DIFFERENT ICN TECHNIQUES

Based on (eq^n 10, 11 and 14) In **Fig.06** Power saving ratio calculate using the formula (IP-based energy consumption/ICN based technique energy consumption).

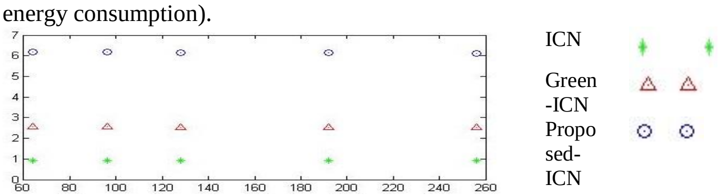
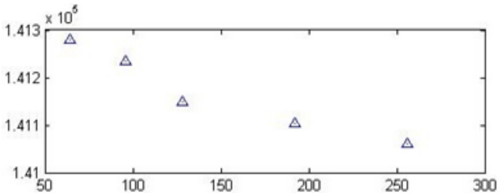


Fig. 06: Power saving ratio of different ICN techniques against IP-based system

Here we see that the most power saving in our proposed technique, then green ICN and last general ICN. Because in Green ICN data stored as (popular content) and (non-popular content) and use ALR. Where our proposed model stored data as sorted form and due to reduce the searching time the power saving ration is increased in our proposed model.

D. POWER SAVING MODEL OF PROPOSED YOUTUBE STRUCTURE AGAINST THE CONVENTIONAL IP-BASED STRUCTURE



Horizontal (X) axis indicates cache size in (GB).
Vertical (Y) axis indicates power saving value (KW).

Fig. 07: Power saving ratio of proposed ICN techniques against IP-based system

Based on (eq^n 9 and 14) in the figure (**Fig.07**), we see that the power consumption is reduced. It because, in most of the time requested contented will be sent from the lower level of the network or intermediate node. So we do not need to go the servers every time. But we see that when the content sized is increased the power saving ratio is reduced. Because the large size data need large amount of power to operate. This is not big issue because the total amount of power is reduced. Moreover the link utilization is optimized. Here also facilitated that data are stored in nodes, it may use as a backup file for YouTube. If any files miss from server, then server can resynchronized from the nodes. And operating time is reduced so power consumption will be reduced. Moreover Link rate will be reduced so other user can use the link and process will be faster.

E. LINK UTILIZATION IN PROPOSED YOUTUBE STRUCTURE

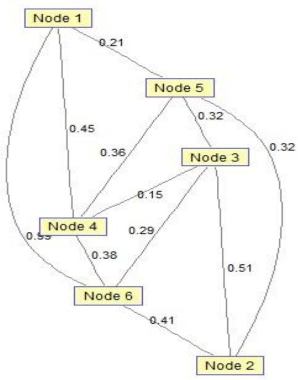


Fig. 08: Assumed Node Connection for YouTube with weight.

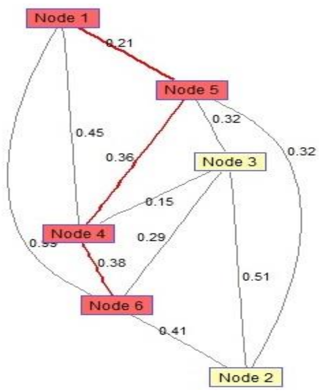


Fig. 09: Shortest Path from user to server for Conventional IP-based routing in YouTube.

Here in (**Fig-08**) we see the node numbers and weight of the edges between two nodes. If we assume the node-1 as a APs node at level-1 and user want to connect with level-1. The assumed weight for the user to node-1 is 0.05 and the server node at highest level is node-06. And if the user will traverse the shortest path (**Fig-09**) in the conventional IP-based network in YouTube the weight will be=0.95. From this value we can get some results from it. If c_p=70% content are popular and stored in level-1 [5] and c_n=30% non-popular then when user will requests for a specific content the most popular data will be served from the lower level and in the maximum 30% of the time the request may go to the root servers, we assumed it. And if the request go to specific node and back propagation is apply to come back data from node to user. Then the result we may get.

1) Total weight for IP-based network = 2*(0.05 + 0.95) = 2
2) Total weight for our proposed network = 2*(c_p*0.05 + c_n *0.95) =2*(0.7*0.05 + 0.3*0.95)= 0.64

Total saving of link = 2 - 0.64 = 1.36=68%

From this situation we can say that, in the new ICN based our proposed YouTube model reduced the link rate. For that faster response is possible, at the same time the bandwidth utilization is improved and power will be saved. And more user get faster response using this link.

VI. CONCLUSION

We have wanted to propose a new caching schema for ICN where data will be sorted as name-wise form. That will reduce the searching time and for this reason the energy consumption of the system will be reduced. In this system the popular items will be stored in lower level so user needs not to go upper levels in every time. So this reason the link rate will be reduced. These mean the system will be improved the link utilization. Request and service time will be reduced, so the system will be faster. Here using the method YouTube will get the facilities to reduce power and link rate and stored data in nodes may use as backup file for YouTube.

Furthermore, we proposed a star network topology model. The users can change easily their position that will not affect the user accessibility and will give more mobility from previous structures because the most popular contents will be stored in the lower level access point router so user can get data in same network without long traverse.

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