Survey: Research on QoS of P2P Reliable Streaming Media

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***Abstract*—Streaming media application has become one of the main services over Internet. As streaming media have special attributes, it is very important to ensure and improve the quality of service in large-scale streaming media. Based on the development of media streaming, it compared and analyzed the typical flow service strategy of media streaming system, and summarized the features and shortcomings of different systems. Moreover, it take the reputation evaluation, node selection, strategy of copy and incentive mechanism as the evaluation index, focus on the quality of service of current typical streaming media system. Finally, future works about the quality of service of media streaming systems in P2P networks are outlined.**

***Index Terms*—streaming media, P2P, Quality of service(QoS), reputation, incentive, churn**

I. INTRODUCTION

With the rapid development of Internet and information transmission technology, such as network audio, video on demand, distance learning, online games and electronic commerce, they are widely applied on the Internet [1]. Large-scale media streaming technology is the key of the development of these applications. The traditional C/S (Client / Server) mode can not meet the need of wide range of real-time media streaming applications, it likely to cause system bottlenecks and therefore cannot provide better QoS.

The P2P technology provides a good opportunity to solve this problem. In P2P network, each client is not only a service consumer, but also a service provider, which makes full use of Internet resources, share in the load of server effectively and improve scalability of the system.

Internet Network Information Center of China recently released the "*27th China Internet Development Statistics Report*" [2] showed that: as at December 2010, China's netizens have reached 457 million. The numbers of users in the network music and Internet vedio, were 79.2% and 62.1%. As streaming media have unique properties, such as data storage capacity, high bandwidth, long time continuous service, high requirements of QoS. There are some problems have not yet been resolved. Quality of service has become an urgent standard to improve in the streaming media business. How to improve the quality of service, enhance the performance of system, and reduce the cost is an important content of the current large-scale P2P streaming quality of service research.

II. RESEARCH ON P2P STREAMING MEDIA TECHNOLOGY DEVELOPMENT

A. *Typical flow service strategy*

The streaming media business needs to provide users with a long and stable video stream, so the requirements of network are strictly [4]. Web-based streaming media system service strategy can be divided into the following categories:

(1) C/S mode unicast

Each client of unicast streaming media needs to establish connection with the central server. If there come a large number of client requests, it may cause the waste of bandwidth and the tremendous overhead of system. The lapse of server could make the whole system down. This feature makes the C/S mode in poor performance, especially the scalability and reliability of the system.

(2) IP multicast mode

This mode establish the multicast tree on the router, the server only needs to send one copy of the data to the client, The router take role of copy and forward, so it has high efficiency and scalability. However, due to the dynamic and heterogeneous of the network, there are some problems such as: congestion control, feedback, storm, etc. are not well resolved.

(3) agent-based distribution mode

Agent-based strategy [5] is to deployed proxy near the client, the proxy server response the client's request. This method has the advantage of saving bandwidth resources, and generating less churn. But the disadvantage is the agencies which increase the cost of the system, and the bottleneck of server is not actually eliminated.

(4) CDN services

CDN(Content Delivery Networks)[6] can smoothly deliver media content with their dedicated high bandwidth networks and large storage capacities, but this comes with high cost. At the same time, the success

of proxy caching of text-based Web objects has seen a number of deployed proxies across the public Internet today.

(5) P2P streaming system

The advantages of P2P network lies in its decentralized peer, self-organization, anonymity autonomy and resource sharing[7], which make the hierarchical m odel of internet service strategy to overcome the shortcomings and improve the system scalability. The disadvantage is it will increase the load, and cannot guarantee the quality of service.

(6) PeerCDN mode

Reference [8,9] proposed a combination of P2P and CDN. Taking advantages of both CDN and P2P networks has been considered as a feasible solution for large-scale video stream delivering systems. The mode of PeerCDN can best protect the previous investment and improve the service capability at the same time.

B. P2P Streaming System Status

Streaming media in the network has higher transmission timing and delay requirements, according to the difference between peer topology and application characteristics, different P2P streaming system can be divided into two categories: tree-based system and meshwork system.

(1) Single tree distribution

In reference [10], Simon Sheu from the University of Florida presented a technique called Chaining, shown in Figure 1. It is the first P2P streaming technique, in accordance with the rules of first-come first-served (FIFO), the request nodes formed a chain. Whether the request of latter node ca n get service from the former node, depending on the interval between their arrival time. If the interval is greater than the buffer size of the former node, it can not form a continuous chain, it needed to get resources directly from the server. Set the buffer window t=5s, the new joining node E first located the server resource, because the interval is less th an the buffer window, so node E can directly obtain media resources from Node D.

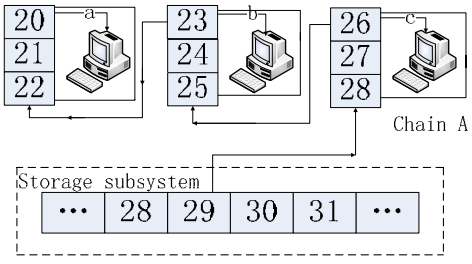

Figure 1. Chaining strategy

Therefore, the deeper level of the chain is, the greater impact of the node leaving the chain. So, the chain structure can only be applied i n small-scale local a rea network.

The typical tree struct ure at home and abroad of the P2P streaming media system were DirectStream[11], P2Cast[12] and so on. In order to reduce the impact of upper left or the failure of the parent node, the best way is to reduce the number of levels.

In reference [11], DirectStream presented by the University of Marseille's, which is a d irectory-based P2P streaming media on demand system, as shown below. Figure 2 illustrates a DirectStream system with one directory server, one c ontent server, a nd a num ber of clients at tim e t. Its main feature is a sp ecial directory server, the directory system used to record the content server and the client node information (such as IP address, cache size, etc.). When a new client node's request arrives, the directory server by querying and then return the media file i nformation to a d estination node. In this system, each node is both server and the client, i t received the recently contents of the cache, and provides cache information for the subsequent nodes.

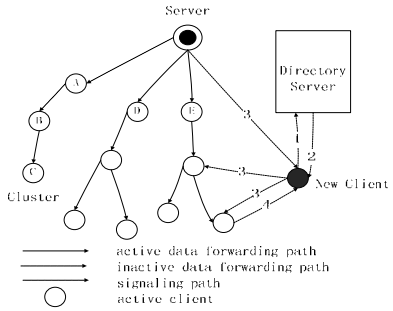

Figure 2. DirectStream Architecture

Reference [12] based on the proposed improvements in the DirectStream, it called P2Cast which uses " patch" program in P2P VoD services, as s hown in Figure 3. P2Cast is a multimedia system which used to provide video on demand services in application layer. In P2Cast, set a th reshold time T, th e customers arriving in time T form session, and form a m ulticast group. In order to make each node can obtain a complete media stream , P2Cast using the patching technology, the nodes which later joined the sam e multicast group is lo oking for a node by adding nodes as the patch server (Patch server) Prior to joining time to get the media data. If t his time interval no greater th an the threshold size, the node ca n still provide a ccess to video streaming, but also nee d to start some programs from other nodes have obtained the part.

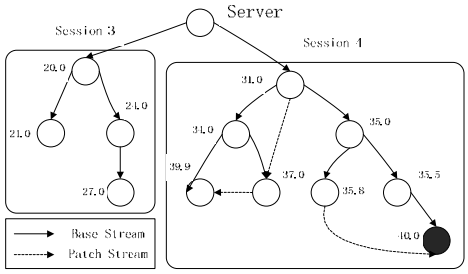

Figure 3. P2Cast Patching

In P2Cast strategy, if the time interval no greater than a so-called patching window size, the node can still provide access to vi deo streaming, but also nee d to start som e programs from other nodes who have obtained the part. This can add more nodes to the multicast-tree, reduce the number of multicast tree and can balance the load.

Lack of a single tree distribution:

1) All the leaf nodes do not take forward the task of the load, making the non-leaf node overload, may become a new bottleneck in the network;

2) It is difficult to achieve seamless playback when jitter caused by nodes dropped out, and high requirements of stability of the network performance.

3) Ignored the needs of the user's view, difficult to achieve a VCR operation.

(2) Multi-tree distribution

Based on the inflow equal to outflow from the same node (energy conservation), it resulted of the multi-tree distribution. The main idea is: divided the media content into N parts, and make each different part of the distribution of trees spread in N trees. The full use of each child node's service capacity may lead a node that can make the internal nodes as a tree and as the other sub-tree leaf node, so the load can effectively share.

Microsoft Research in the literature [13] proposed SplitStream which is built on Scribe[14] protocol, based on the distribution of multi-tree structure, as shown in Figure 4. Each tree node of Splitstream receives the data, but only forward the data from one distribution tree, and the task of forwarding data evenly distributed to all nodes, so that the node effectively reduce the load and enhance the fault tolerance of system.

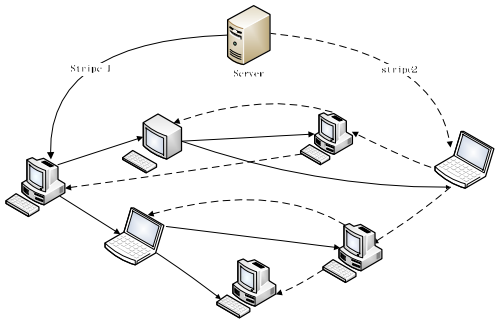

Figure 4. SplitStream structure

Reference [15] presented the CoopNet which is a multi-sender single-receiver transmission, achieve the integration of C/S and P2P modes, as shown in Figure 5. In CoopNet system, one or a group of high-performance central server node is responsible for organizing the establishment and management of multiple data distribution tree, these data distribution tree form the entire transmission P2P network .

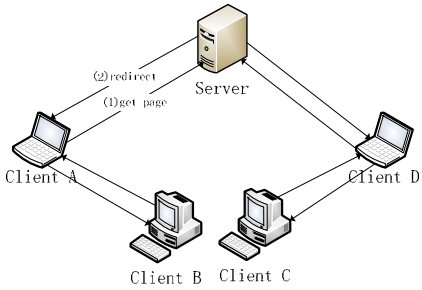

Figure 5. CoopNet structure

Through the establishment of more multi-tree multicast distribution tree, the multi-tree will block the media stream to spread in a different tree. Characterized by decentralized services of the source server load, but the distribution path is fixed, it will cause congestion and jitter in the network.

(3) Mesh topology

Mesh topology has no fixed paths to obtain data, the source server will cut the media file into a small stream, and then push them to a different peer nodes. Each node driven by the data, then the node request the dynamic potential of the data provider and obtain the required data block. Typical examples of distributed network: GnuStream[16] and Promise[17].

Reference [16] proposed GnuStream, a peer-to-peer and receiver-driven media streaming system. GnuStream is built on top of Gnutella, and it integrates dynamic peer location and streaming capacity aggregation. It use flooding search to find resources. Shown in Figure 6, P1 wants to find media files X, then after inquiry services, P1 locks the four candidate nodes P2, P3, P4, P5. If P2, P3, P4 could just meet the bandwidth of the media file X, then the sender P5 will become a standby to replace the other nodes.

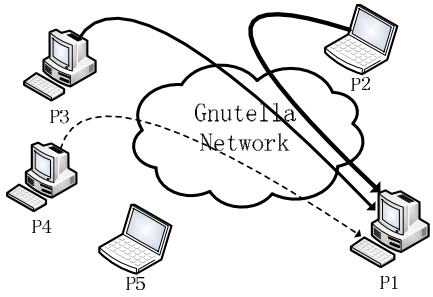

Figure 6. GnuStream structure

Reference [17] is based on the Promise from the Purdue University's new application layer multicast strategy which called CollectCast. The underlying network of Promise can be any existing P2P networks, the authors chose the Pastry as its underlying structure. When select the best available node it through using sensing technology, the status of the network as the basis for selection. And get the candidate nodes through the underlying network.

CollectCast is the "multiple senders transmit data to one receiver" model, as shown in Figure 7. The difference from others is that: each CollectCast session has two senders: dynamically switching active senders and standby senders, so that the collective network performance out of the active senders remains satisfactory.

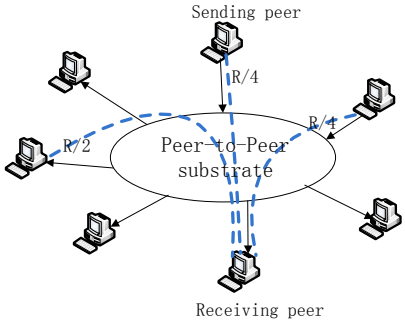

Figure 7. CollectCast structure

The distribution based on mesh topology network [26] can avoid the jitter caused by the leaving of the node, it also can take full use of network bandwidth resources, and it has been widely used in the heterogeneous networks.

III. RESEARCH ON QOS IN P2P STREAMING MEDIA

Quality of Service (QoS) is a used quantitative index to measure the satisfaction with service. In P2P streaming media system, the key indicators used to measure the QoS mainly includes the performance indicators like bandwidth、 delay、 delay jitter、frame loss rate 、 throughput per hour and so on[18].

In P2P peer-to-peer network, there exist the heterogeneous service ability of the service node itself, the dynamic node in the process service[19] and the particularity of streaming media itself, such as the high bandwidth, the huge data storage, the lasted long time service, the strict requirements on time limits、order and quality for broadcast etc. These make P2P streaming media face a lot of challenges in developing high service quality transmission technique.

Because the traditional IP network only provides the service on its best, the weakness which does not guarantee the quality of service is also revealed. As the documents[20 、 21]mentioned, in order to provide corresponding QoS guarantee to different business in the IP network, an universal network traffic service quality guarantee system irrelevant to the business is built. The core idea of this mechanism is the guarantee of the whole network.

The existing research results include that the IETF (Internet Engineering Task Force) presents two different Internet QoS system structure of integrated service (IntServ)[22] and different service (DiffServ)[23] in September 1997. The advantage of IntServ is its good QoS guarantee, but the defect is that the scalability in this way is poor and IP network links is difficult. The biggest characteristic of DiffServ system structure is its simple achievement and good expansibility, but it does not provide end-to-end QoS guarantee. In addition, the QoS routing controlling planes[24] and resources reserve mechanism (RSVP) are also proposed. The data in the plane of the various QoS queue, packet-discard algorithm flow congestion management algorithm[35] flow plastic algorithm are presented.

Currently, the research on improving QoS of P2P streaming media mainly include reputation mechanism、node selection mechanism、 copy strategy and incentive mechanism etc.

A. *Reputation Mechanism*

In P2P networks, nodes have to cooperate with each other, each node would like to cooperate with the trusted node, it needs a credit rating system to all nodes on the evaluation of credibility. Evaluation of the accuracy of credibility will affect the selection of high-capacity nodes and remove malicious nodes, which is important to the QoS of media streaming.

From the P2P networks are widely applied to the present, the relevant credit mechanism has been studied for many, reputation-based trust mechanism in the literature [25] Yuan Wei et al proposed HBDTM model which is a local reputation-based trust mechanism. This model based that history of node behavior, but did not give the method of time behavior of the node for determining the impact.

In reference [26] Kamvar proposed a reputation model called EigenRep which based on global reputation in P2P environment. The model through the iteration of neighbors' mutual satisfaction to obtain the credibility of the node, which can better reflect the real behavior of the malicious nodes in network, but there exists convergence problems.

In reference [27] Jiangshou Xu, Jian-zhong Li, who proposed a mechanism that based on local reputation and the global reputation, its main idea is:

(1) Initially, the trust mechanism assigned each node for a local reputation value of 0.5, which denote the local reputation of node for the middle;

(2) When the node i want to deal with node j, the trust mechanism first obtain the j value of i's local reputation, and reputation based on local values and other information to calculate the value of j's global reputation. Finally, the confidence factor will take j as the local reputation and integrated with the global reputation of j by i trust;

(3) According to trust i given to j, node i should determine whether transact with node j;

(4) After the transaction, i and j will give an evaluation of each other, the trust mechanism based on the assessment, evaluation and other information previously calculated the local reputation between each other.

Reference [27] also defines trust: the node i on node j's trust Tij is the use of the confidence factor for the node j (relative to i) the local reputation and the global reputation of node j drawn from the trust of the j level. Node i on node j's trust Ti j is defined as[27]:

$$T_{ij} = \alpha L_{ij} + \beta R_j \qquad (1)$$

And α and β is the confidence factor, $0 \le \alpha$, $\beta \le 1, 0 \le T_{ij} \le 1$, the confidence factor representing the node i on node j (relative to i) the local credibility of the global reputation of L_{ij} and Rj.

When node i interacts with node j, it will calculate the global reputation of node j which need to use node i's

local reputation, the local credit L_{ij} is defined as follows[27]:

$$L_{ij}=\begin{cases} \phi(M_k)L_{ij}^{(n)}, & fTS_{\text{current time}}-TS_{\text{last trade time}}\le\tau \\ (1-s)\phi(M_k)L_{ij}^{(n)}, & fTS_{\text{current time}}-TS_{\text{last trade time}}>\tau \end{cases} \quad (2)$$

To simplify the discussion in the literature, let $t0 = T_S$ as trust start time, n is the times that the interaction between node i and node j at the time $t0$. The global reputation is defined as follows[27]:

$$R_j=\sum_{i=1}^{m}\rho_i L_{ij} \quad (3)$$

This is calculated by the global reputation of local reputation, which is expected in the calculation of the weight of global reputation. The L_{ij} and ρ_i are initially setup of 0.5, and to determine the confidence factor to determine the credibility of local and global weights.

Reference [27] obtained the results of test by comparing, this trust mechanism which based on local prestige and global reputation with low computation and storage load, and has a different trends about the quality of its evaluation , the confidence between the higher number of access nodes is greater.

Reference [28] Jing-tao Li et al recommended a model which based on similarity weighted global trust (SWRTrust), this model has some cheating on the cooperative identification and containment capacity, but also exist the credibility of the trust value of the management node issues. Reference [29] by HU Jian Li et al presented a global trust model based on feedback credibility. It enhanced some aspects especially from malicious nodes' attack, the validity of the convergence of iterative computation and information, besides it has high cost. But the drawback such as the security of the storage mechanism and the corresponding incentives are not taken into account.

B. Peer Selection Mechanism

The performance of P2P streaming system is dependent on the P2P network topology, excellent network topology would bring good quality of service, and the key is the selection mechanism of the node . An ideal service provider node includes the following features:

1) Stability: the receiving node does not exit during playback;

2) High bandwidth: provide good stability to meet the requirements of broadcast bandwidth;

3) Low latency: provide the minimum delay among roads, the more hops, the less delay.

A well-behaved node is that its online time should be long enough. Reference [20] defines a good collection of nodes which construct a node's contribution function maximization. The optimization function is defined as follows[20]:

$$\max\sum_{j=1}^{N}\bigcup_{i=1}^{N}\left\{(c_i \setminus c_j)\cdot e_{ij}\right\} \quad (4)$$

Satisfy for all i:

$$\sum_{j=0}^{N} e_{ij}\le d_i \quad (5)$$

(4) if $eij = 1$, the node i and node j is connected, otherwise $eij = 0$. C represents all segmen ts of the collection contents, $\{ci \in C: i = l, ..., N\}$ that the contents of the block on each node collections. Then suppose that each node i may be connected the numbers up to di, where $di < N$. Ref.[27] by the set of higher degree of credibility nodes to maximize the contribution, to achieve a good build robust network topology.

Reference [17] proposed two methods to select multiple nodes which based on Promise, that is: end-to-end selection and topology-aware selection. Two mechanisms all need to identify the "good degree [30]"of nodes. Ref.[30] considered a good degree of the transmission path delay, packet loss rate, available bandwidth and other indicators. The selection mechanism of End-to-End is a separate calculation only considered the good level of path, without considering the correlation between the paths. Aware topology selection mechanism is fully taken into account of the correlation between these pathes, choose the least related to the candidate path nodes, thus ensuring quality of service.

Reference [12] used patches in the P2Cast technology, it presented that the node after adding the node selection algorithm based on BF (best fit) to select the most suitable bandwidth parent. Comparison of this algorithm is only take bandwidth into account, the one who provide maximum bandwidth of the node is the father node. BF-delay algorithm considered the delay between request nodes and the candidate nodes.

C. Copy Strategy

We can use a copy of fault-tolerant strategy to solve problem of network jitter [31]. The most common method is to select many good sending nodes, one as the current active node, the other as a backup node[41]. Most of the current study focused on how to switch between the main and backup node when the reduction of network jitter and maintain the continuity of streaming media services. Raman et al in [32] realized the customer's caching mechanism to ensure the continuity of streaming media in a short time.

Reference [33] Padmanabhan et al. studied show that the data can be connected to each other so as to improve the availability of distributed services. The more the number of copies, the better quality of transmission, but taking into account of different storage capacity of each node ,how to determine the copy number saved and stored is very important and the performance of system will significantly affect the QoS.

Reference [20] according to the data range of each node, recent studies can be divided into three categories: initial data cache[11], recent data cache[12,34] and global specify cache[35].The initial data cache is that each node only cache the beginning of data; recent data buffer cache in which each node only recently received their piece of data, the global cache is specified by the cached data for each node range from some of the central node based on a global strategy.

Reference [36] Ge Yang et.al have put forward server caching algorithm based on the proxy in paragraph popularity, that is, copy the data on the proxy server, select the appropriate section of the replacement algorithm according to popularity. The cache replacement algorithm called PCRAM2S. The main idea is:

(1) Calculated the popularity of last paragraph for each media, select the smallest object in the section which not requested by the client, and then replace the popularity second-less of media, until there is enough cache space.

(2) When accessing the media object which has been visited, if the first not being accessed section of the object's popularity is greater than current cache which has the minimum of popularity, it will replace the latter, until there is sufficient buffer space or give up caching.

Reference [36] defines a media object in popularity functions:

$$popularity = \frac{\frac{T_{sum}}{T_{last} - T_{first}} \times \min\left\{1, \frac{(T_{last} - T_{first})/N}{T_C - T_{last}}\right\}}{H} \quad (6)$$

Function of the media section popularity[36]:

$$U = popularity \times \frac{1}{D(s)} \quad (7)$$

Of which:

T_{first}: media object first time accessed;

T_{last}: media object last accessed time;

T_{sum}: total length of time the media object access to;

T_C: current time;

N: number of media object is accessed;

H: amount of data that current proxy caching a media object;

D (S): distance function of the last section S of media object in the cache;

$$\min\left\{1, \frac{(T_{last} - T_{first})/N}{T_C - T_{last}}\right\}$$ possibility of the media object after the visit in the future.

In reference [36] the replacement algorithm require the replacement of the media object has been accessed at least 2 times, when a cached media had to be replaced, the proxy server will save the first section of the media, so that its popularity is still valid, the search efficiency and the utilization of buffer space have been improved. However, the application of 3G networks, as customers have different requirements for quality of streaming media, caching proxy server requirements are not the same, it need to distinguish between different media objects, which is worth considering in future research.

D. Incentive Mechanism

For P2P network nodes, each node makes different degree contribution for the whole network. P2P streaming system need more excellent node to satisfy flow media transmission QoS' requirements and spectators' watching needs. According to the node dynamic-force for such activities good nodes incentive to make it have longer online, the better for un-ling other nodes service is a key problem, so we need set some incentive mechanism and punishment mechanism for good and bad behavior respectively ,which is the corresponding measures to manage.

According to reference [37], Gnutella research points that 70% of the user in the system do not share any file, almost half request is handled by 1% of user. This action that the user just want to enjoy services, and not willing to make contributions for the network is called free riding (hitchhiking), this phenomenon exists generally in the network, and make big effect to the whole network and service quality .

There are some sharing system of technology based on peer-to-peer file mentioned in the reference[38] , such as Gnutella, nullification (e - Donkey)[39], BT download (BitTorrent)[40] etc, and the number of the global online user reaches to tens of millions . Since the birth of Peer-to-peer network technology, it has always held the service spirit that share the information with everyone, in line with everybody for me while I for everybody. However , each node of the peer-to-peer network is not really implemented the information sharing ideas about the equivalence providing services and enjoy our service.

The most common incentive mechanism can be roughly divided into the following categories:

Reference [40] presented Bit Torrent adopted sustains the incentive mechanism to inhibit the hitchhiking behavior, which is a method that each node with the larger priority choice to provide greater download bandwidth node provides uploading data service. The systems encourage node as seed node, providing the uploader more nodes, can enjoying the greater download service priority is greater. This kind of game theory method is called TFT (Tit-for-Tat)[41], its core ideas are is: the quantity of service node providing will equal to the one node enjoying many service will enjoy node how many service .This TFT is a fair mechanism of way , which has a defect that the node with lower servicing ability difference node will not get the timely corresponding service timely, which may not be able to survive, so it's not suitable for the scale of VoD using.

Reference [41] mentioned another kind of incentive mode asymmetrical FTF, that means no matter what the service ability difference of nodes,even if it does not provide any services but also have basic social welfare, nodes of ability need to provide greater contribution to help service ability difference node. This way of give attention to two or more things arrive ability difference of nodes, making full use of nodes in the system, but the pursuit of service way of average ability strong node is unfair, and easy to cause the user antipathetic.

In reference [42、43] ,it put forward virtual currency mechanisms, main idea is:if a node provides services it will adding virtual currency, and reduce virtual currency when a node obtain the service.This mechanism is open, it can use real currency exchange, such as service ability difference node as long as enough of virtual currency can also obtain the good service. This kind of mechanism seems to be fair, but they require higher safety requirements and hit the enthusiasm of ability nodes.

Incentive mechanisms related to how to encourage the ability node, and how to make nodes provide more contributions to system performance. Incentive mechanism has two goals: (1) stimulate nodes to do more contribution for system (2) encourage nodes extension the online time, the second goal is difficult to achieve, it is worth further research.

IV. FURTHER RESEARCH

How to resolve the current QoS problems in P2P credibility streaming media, future work still has a long way to go. Looking at the existing research results, the future can be in the following areas for further research:

A. Model of Reputation

Establishment and Construction of a good reputation model has great significance to the current P2P streaming service quality research. Through calculation of the local reputation and global reputation, it can get the reasonable weighting factors between them. In order to solve the problems for the current model, the reputation value of node dynamic updates and the calculation of the credibility nodes, the punishment of malicious node, there is still a lot of work needs to do.

B. Select the node to minimize jitter

The network jitter makes there is no guarantee about the quality of service. How to quickly implement the replacement with standby when find the node failure without affecting the sending node to other nodes, and reduce the impact of jitter to a minimum on the network? For the online nodes of good behavior, should make full use of these nodes to solve the jitter caused by increased network traffic and routing information errors and other issues.

C. Cache policy based on popularity

To realize the continuity of the streaming media in process, you need to advance proactive and cache part of the data block, which will response the network jitter block. These proactive blocks have been received before playback, so you can guarantee the media quality of service to a certain extent when the network node has changed. After playing in a block, the node can immediately discard it or keep it in the cache for some time. When requesting a block, the node will first attempt to have some cache from other nodes of the block to get it; if it fails, the node will request the block from the server. The most important is to improve the hit rate of data blocks when the server's capacity is limited.

In streaming media, how to reasonablely copy these pop blocks, and the location of the place where it copies. Correspondingly, some data blocks with lower popularity, they will be eliminated by high prevalence of other data blocks replaced.

D. Incentives for high-reputation nodes

In the study of incentives, how to encourage the poor service node to increase its online time as much as possible. To some extent, free-riding behavior is the promotion of network activity, and such phenomenon is inevitable. How to make free-riding nodes contribute to the system, there needs to establish a reasonable incentives mechanism to balance the various nodes.

On the other hand, how to encourage more nodes to provide services to less popular programs and improve the quality of service. Meanwhile, the node uploaded its neighbor nodes' local reputation periodically value to the management server. Server of the reputation management calculates and updates the global reputation value. Besides, inspirit high degree of credibility nodes, and encourage the nodes which have a longer online time but have low credibility to provide services to other nodes.

V. CONCLUSION

Quality of service in P2P streaming media is the focus to improve the level of streaming business. This paper introduces the system of streaming media service strategy and service system, analysis the service quality of streaming media on the current status, focus on several mechanisms that affect the QoS. Through analysis and comparison the results of previous research, we can clearly understand the impact of mechanisms to improve quality of service and the work have done. Finally, predicted the QoS of P2P streaming media for further research.

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