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Managing Peer to Peer and Overlay Content Traffic in ISP Networks

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***Abstract*- Peer-to-Peer content distribution systems are major source of traffic in today's internet services, Peer-to-peer (P2P) traffic consumes network resources without creating additional revenue. It is estimated that high percentage of broadband bandwidth is consumed by downloads of music, games, video, and other content. The use of peer to peer systems introduces many new problems related to traffic engineering or network optimization. This research work will investigate characteristics and behavioural interactions between Peer to Peer overlay content distribution operations, as well as suggests/discuss algorithms for optimizing P2P content distribution overlay infrastructure and the internet service provider "ISP" network. Techniques to harmonise the relationship between P2P overlay content distribution services and the underlying network is also discussed. Indeed the system performance of a P2P network is critically affected by its overload, thus the processing load of the peers, the communication load and the system management load, must be carefully handled to obtain satisfactory system performance.**

***Keywords* – P2P, ISP Networks, Processing Load, Communication Load, System Management Load.**

I. Introduction

Management of Peer-to-Peer traffic has become a challenging task as it requires meeting the diverse requirement of all involved parties; Thus the users, the overlay providers, and internet service provider (ISP), the basic requirement of the users are increased performance and quality of experience, while the main good of overlay providers are to achieve decreased load on their servers by increasing content availability in the overlay and the ISPs targets to minimise their cost, particularly those increased from inter-domain traffic, the relevance of mechanisms matching the interests or requirement of the three parties become more crucial as increasing, popularity of high-resolution video content and file sharing amongst the internet users. The P2P traffic occupies major chunks of the internet traffic today. This increasingly issue motivated and pushed researchers to study and improve the scalability and performance of overlay networks. P2P overlay networks are application-level logical networks built on top of the physical networks as shown in figure 1.

II. Overview of P2P and Overlay Networks and Services

P2P technology enables the sharing of computer resources and services, including information, files, processing cycles, and storage by means of direct exchange between participants in a P2P network. In P2P network services, each participating host, called a peer is connected to other peers forming the P2P network as illustrated in figure 1; the network maintains separate addressing and routing mechanisms to enable efficient search and data exchange between peers. P2P overlay network do not require any special administrative or financial management, they are self organising and adaptive, distributed and decentralised P2P overlay networks are categorised as Unstructured and Structured.

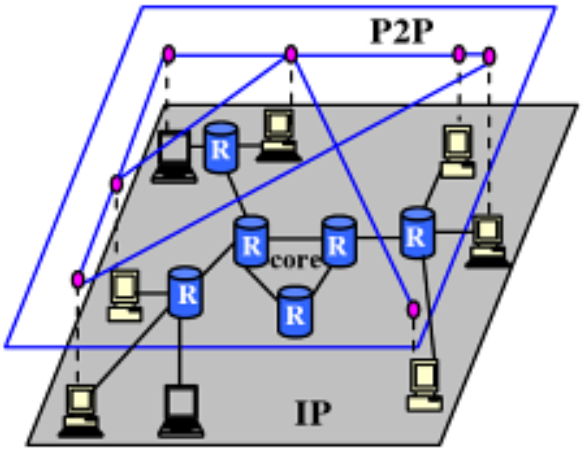

Fig.1. P2P overlay Networks [2]

Unstructured P2P systems is composed of peers joining the network with loose rules, without any prior knowledge of the topology unstructured overlay are built by establishing random neighbouring relations across node e.g. of popular P2P application; Bittorreant, limitation, Gruella, Wondex, Kazah and Donkey.

Structured P2P overlay networks has a topology that is strictly controlled and content is placed not at random peers, but at specified locations that will make subsequent queries more efficient. Most of the structured P2P overlays are Distributed Hash Table (DHT) based and Content Addressable Network (CAN).

III. Characteristics and Patterns of P2P and Overlay Based Traffic.

P2P technology enables the sharing of computer resource and services, including information, files and processing cycles and storage by means of direct exchanges between participants in a P2P network; As a result, P2P networking is very efficient and resilient method of distributing content over IP networks. However, its mass popularity and bandwidth- hungry nature are threatening to exhaust service providers network resources, furthermore, P2P applications pay little or no

attention to geographical locations when they peer with each other and distribute content over an ever-growing number of hops, a process that uses up network resources and drives up services providers operating cost. On internet P2P is a type of transient internet network that allows a group of computer users with same networking program to connect with each other and directly access files from one another's hard drives. Napster, Limewire and Gnutella are examples of this kind of Peer-to-Peer software. Major producers of content, including record companies, have shown their concern about what they consider illegal sharing of copyrighted content by some P2P user, while some co-operations are looking at the advantage of using P2P as a way employee can share files without the expense involved in maintaining a centralised sever and as a way for business to exchange information with each other directly. Peer- to-Peer overlay computing has been seen as a promising technology that will reconstruct the architecture of distributed computing over the internet. This is because P2P can harness various resources like computation, storage and bandwidth at the edge of the internet with lower cost of ownership and at the same time enjoying many desirable features like scalability, autonomy, collaborative network environment etc. Furthermore on understanding P2P systems, let's consider the architecture of P2P systems to enable us appreciate the relationships and differences between P2P and other distributed computing paradigms based on existing systems some P2P systems are supported by centralised servers, while pure P2P systems are completely decentralised .

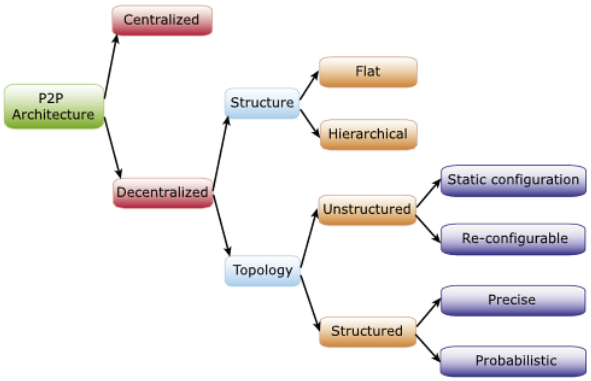

Fig.2. TAXONOMY of P2P System [3]

Generally P2P system is broadly categorised into centralised and decentralised system, based on the availability of one or more servers, and to what extent the peers depend on the services provided by those servers.

IV. CENTRALISED P2P SYSTEMS

The type of P2P system has a mixed characteristic of decentralised n centralised architectures. Here, the model user can send a query for a file to the centralised server, and then the server would then send back a list of peers that have the quest file. One the user chooses which peer to download the file from the centralised, which would then facilitate the connection of the peers then remove itself from the process as shown in figure 3, thus the peer could then communicate directly to with other peers without group through the server anymore.

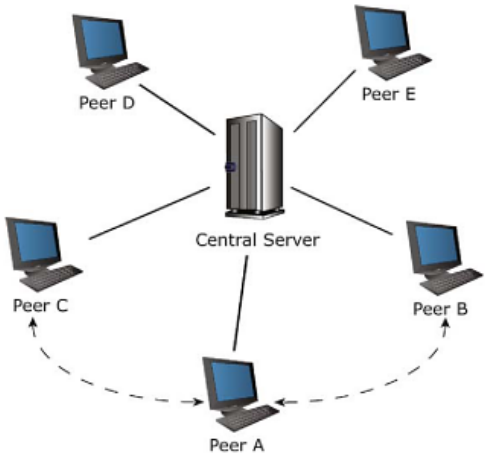

Fig.3. Centralised P2P System [4]

This architecture of centralisation can have one or more central servers, which help peers to locate their desired resources or act as task scheduler to co-ordinate actions among them.

V. DECENTRALISED P2P SYSTEM

This is a kind of system where Peers have equal rights and responsibility, each peer has only a partial view of the P2P network and other data/ services that may be relevant to only some queries/peers: as such locating peers offering services /data's quickens is a critical and challenging issues, since there is no central server that could response quickly to peers queries, as it is a centralised system. When a peer wants to connect to a decentralised network it connects to another peer and tells it is alive. This peer will in turn tell all of the peers it is connected to, that the initial peer is alive, with all of these peers repeating ,with all of these peers, repeating the process once this is done a peer can search for a desired file by sending its request to any peer it is connected to. Those peers then send the request to its peers, when a peer notices it has the desired file it sends a reply through the network. At that point the searching peer can download the file directly from any peer that replied back.

There are two dimensions in the design of decentralised P2P systems (from Fig.2). First, the network structure can be flat (single-tier or hierarchical [multi-tier). In a flat structure (non- hierarchical) the functionally and load are uniformly distributed among the participating notes. On the other hand hierarchical design naturally offers certain advantages including fault isolation and security, effective caching and co and with utilization, hierarchical storage etc.

In a hierarchical structure there are multiple layers of routing structures, for instance, at state level, there are routing structures, to interconnect cities there will be another routing structures to interconnect cities, with cities

there will be another routing structure to connect time zones, then another to interconnect universities and say college etc.

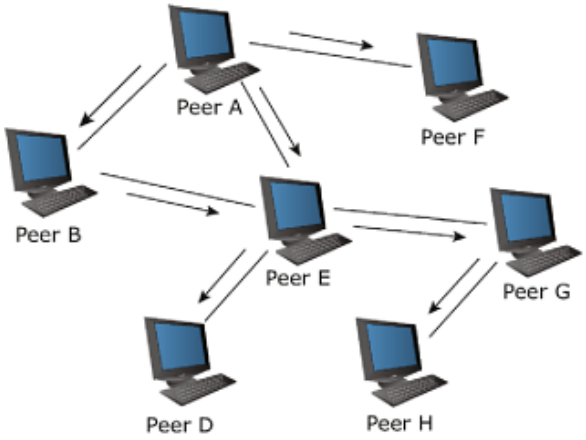

Fig.4. Decentralised P2P System [4]

The second branch of decentralized system is logical network topology, the overlay network. This could be STRUCTURED or UNSTRUCTURED. The difference between them lies on how queries are being forwarded to other notes.

In an unstructured P2P system, each peer is responsible for its own data and keeps track of a set of neighbours that it may forward queries to. Here there is no strict mapping between the identifiers of objects and those of peers, thus locating rata in such a system is challenging since it is difficult to precisely predict which peer maintain the queried data, also there is no guarantee on the completeness of answer unless the entire network is searched, and there is no guarantee on response time except for the worst case where the entire network is searched. A key issue of unstructured P2P system is the determination of the neighbours. These neighbours are determined based on a peer's interest rather than user's interest. In a structured P2P system that a placement is under the control of certain predefined strategies, usually, a distributed hash table "DHT", giving a unique mapping between data and peers, most often for security/ privacy reasons, here the owners have full control over their own data. More importantly, these systems provide a guarantee and precise on search cost, however maintaining structured P2P system is expensive most of the structured system including CAN, chord and pastry adopt the key – based routing strategy to locate the desired resource.

VI. Potentials, Benefits and Applications

Peep to peer computing is essentially a model of how people interact in real life. We deal directly with one another whenever we wish to very often, when we need something, we ask our peers (in this case in real life is friends) who may in turn refer us to their peers, Peer to Peer technologies enables us, through our computers to carry our interaction into cyberspace and to continue to deal with one another as we do in the real world.

In today's internet, P2P computing has tremendous potentials to meet any institutions or organisational and personal needs, it does not only leverage on computing resources without incurring excessive cost but also allows information to be disseminated effectively, upon exercising full control over own data, either by making sure that the data is only stored on their own system, never allowing it to be copied on the other hand, it may decide to publish the data anonymously and have all traces to the content erased by immersing themselves in a pool of notes that collectively share the responsibility.

VII. Numerous Applications Advantages of P2P System

A. Digital Content Sharing: the internet is essential as asymmetric place of storage of shared content, where there are a small number of content provides or servers but a large number of content consumers or end users. This paradigm is rendered in viable by the new reality, where every user has the possibility to generate huge amounts of data. P2P technology overcomes this asymmetry by enabling users act as a producers or products, as well as consumers or end users. Examples of P2P platforms that support content sharing are Grutella, freenet, free haven, publis etc.

B. Collaborative Work Environments: Today's work environments involve people who may be geographically dispersed, hence difficulties in facilitating cooperation. P2P technology lends itself well for cooperative collaboration environment, here collaboration is being created by and for the team members to interact and work together on project in real time, modification of shared content is possible by any user and automatically synchronised for consisting some example of P2P collaboration platform are groove, magi etc.

C. Collaborative Caching And Storage & Instant Messaging; example of such platform is Skype.

VIII. Challenges and Design Issues

A. Availability: In a P2P network environment, nodes are autonomous and can therefore join and leave the network as and when they like.

This makes the system unpredictable, a resource or service may be available at some time but not all the time, as such critical data or services may not be available when they are needed.

B. Performance: If same query are posted at different times, it may be answered not only with different answers, but also with different costs, largely depending on note availability/ connectivity and the network topology as at the time of quering. Here load balancing mechanism can be used, for instance, notes that are more powerful may be

exploded to perform a heavier load, but sizing up capacity of a note is not always easy n straight forward.

C. Routing and Sourcing Recovery: The main requirement from a P2P environment is to be able to locate data or resources, using a G-nutella mechanism as an example, Gnutella broadcasts a query from a query note to its peers who in turn will relay the message to their peers and so on, such method is simple, but does not require any metadata to be retained and can potentially reach to a large no of peers in the network. However, flooding the network with queries in efficient because it generates a huge amount of traffic, hence challenge to design effective and efficient data/resource discovery mechanism.

D. Security: P2P system posses a lot of security issues, like any other application, P2P Systems norm of openness and sharing just make the security issues more prevalent. By allowing other nodes to access a node's content/service the note is more vulnerable to attack in the situation where it acts only as a client. Similarly, because many nodes are used to transfer messages, the network could be vulnerable to denial of service (DOS) attacks particularly in unstructured networks. It is relatively easy for a malicious note to flood the network with queries and such attack will be hard to detect. Since these are at application level. Absence of security and control makes it impossible to guarantee the integrity and security of content and limiting the quality and the diversity of available content.

IX. Behavioural Interactions between P2P/ Overlay Based Content Distribution Operations and the Underlying Network Layer Traffic Engineering

In the internet which is a collection of autonomous system, packets are forwarded along a path on a peer-prefix basis. The choice of path via the routing system is limited by the contractual agreements between autonomous system usually is shortest path routing based on a fixed per link cost. P2P systems, on the other hand, setup an overlay topology and implement their own routing in the overlay topology which is no longer done on a peer-prefer basis but rather on a query or key basis. In unstructured P2P networks queries are disseminated, e.g. via flooding or random walks while structured P2P networks often use distributed hash table "DHT" – based routing systems to locate data, responses can either be sent directly using the underlay routing or through the overlay by retracing the query path.

Internet service providers employ traffic engineering on their networks to control how much resources are used and to optimise performance on their network, while protocols such as Multi Protocols Label Switching (MPLS) allow ISP'S to permit sources some control over how their traffic is routed to its destination. Currently, it is the basic role of ISP to decide the path traffic will take through its own network and also the resources the traffic would be utilising. The traffic engineer's decision to be sole decider a route for all traffic in its network may almost never be applied to the intended traffic, because the engineer may be unaware of the structure of content distribution system or overlay networks, her management of the network does not fully anticipate how traffic might change. The ISP's performance optimization may be frustrated, however by a response to its traffic engineering by the users of the network. Typical peer to peer networks and content distribution system have the property that a user is not concerned about which particular server he/she uses. If traffic to a sever is slowed as a result of traffic engineering, he/she m ay break the connection and break a new one with a different server, if server selection is implemented by an application the user is running on or using these connections may respond on how much faster time scale then the ISP's traffic engineering- The ISP's policies may almost never be applied to the intended traffic. In a general overlay network, several different traffic flows in the underlying network may be created.

X. Managing Issues of P2P Overlay Networks

The properties of P2P traffic are usually transient and difficult to predict, the most popular P2P content distribution systems divides the content into relatively small pieces, so that peers can download and upload different parts if the content from and to different peers with which a peer simultaneously. The set of peers with which a peer exchanges data can change relatively fast. In large P2P system, this may lead to traffic fluctuation on short timescales, which results in inefficient traffic management and the breakdown of network dimensioning assumptions. A number of ISP's attempted to decrease their costs due to P2P traffic by restricting it in her networks. Some ISP's deployed traffic others throttled the bandwidth of the heaviest users irrespective of the types of applications they used. Some ISP's injected packets to reset the ICP connections used to transfer data between the peers. These techniques rely on identifying the P2P traffic in the network, either via the ports it uses or via deep packet inspection, conventionally internet applications transported via TCP have been assigned a specific TCP port, making the traffic easy to identify.

First generation P2P application were designed to use well-defined port number, these flexible configurations made it easy for service providers to monitor specific applications and use routers and content switches to perform traffic shaping or to use blocker techniques to ensure QOS and manage bandwidth usage, however the current generation of P2P applications have the ability to disguise their existence through the use of arbitrary and dynamic port numbers, often referred to as "port hopping". This capability combined with the applications ability to encrypt payload content, makes it extremely difficult to categorise P2P blocking and shaping techniques inefficient/ ineffective.

XI. Proposed Solution Analysis for Managing P2POverlay Operation

A. More Bandwidth: When network resources are constantly overwhelmed, the most obvious approach is to acquire more bandwidth or upgrade the existing infrastructure to handle the increased load. However, this solution has a very difficult, expensive and limited life span since P2P tends to expand to full the available bandwidth again and again.[6]

B. Impede P2P Trafic: band- This implies blocking at the network access point, TCP ports that are commonly used by popular P2P applications. The aim is to reduce width usage by striking all P2P traffic entering the network. However, it is not easy to block P2P traffic since it is able to camouflage as non P2P traffic. Many P2P applications enable users to select desired ports or assign ports dynamically, with the sole interest of circumventions standard P2P blocking practices. There better concern to service providers, like maintaining customer's satisfaction, blocking all P2P will most certainly lead to customer's confidence.

C. Shape P2P Traffic: Traffic shaping provides a mechanism for controlling the volume of traffic being sent into network resources and the rate at which the traffic is being sent. The main advantage of traffic shaping is that service providers can gain a degree of control over. Shaping technique could also bring tremendous poor QOS, since each and every data packet requires to be inspected in order to be classified as P2P, this will introduce significant network latency and lowers processing times for all traffic, hence poor performance from ISP's. This technique affects most subscriber for real-time services such as VOIP, IPTV AND VOD.[6]

D. Utilize Network Caching: Caching P2P content enables ISP's to maintain a repository of the most frequently downloaded P2P files in a local network. This technique minimizes some of the downstream bandwidth and transits cost associated with P2P traffic. Despite the seeming advantage, caching could be thought as illegal.

E. Implementation of Bandwidth Caps: Capping bandwidth enables ISP's to introduce tiered pricing schemes. By charging different prices for each service tier, determined by usage pattern,

In Conclusion; Service providers are eager to deploy intelligent approaches to manage the ever-growing popularity of P2P. The impact of P2P application on network traffic patterns capacity planning and infrastructure upgrades is significant service providers must find ways to manage high bandwidth P2P traffic while maintaining customer satisfaction as well as the overall subscriber user experience for all services, especially revenue generating IPTV and voice services.

XII. Algorithms for Optimization of P2P and Overlay Content Traffic through Cooperation between the Content Distribution Overlay Infrastructure and the ISP Network

Peer to peer (P2P) content distribution systems are a major source of traffic in the internet but the application layer protocol they use are mostly unaware of the underlying network in accordance with the layered structures of the internet's protocol stack. [5] Their primary use has been off-line content distribution, i.e. file sharing (e.g. BITTORRENT, Gnutella, e Donkey), but they are increasingly used to stream live and on demand video as well (e.g. Sopcast, PPlive zattoo). Nevertheless , the need for improved network efficiency and the business interests of ISP's are both strong drivers towards a cross-layer approach in peer-to-peer protocol design, calling for P2P systems that would in some way interact with ISP's interaction is known to rely on information provided by both parties, and can be mutually beneficial.

Internet Service Providers employ traffic engineering on their network. While protocols such as Multi Protocols label switching (MPLS) allow ISP's to permit sources some control over how their traffic is routed to its destination, presently it is primarily the role of the ISP to decide what path the traffic will take through its own network and hence which resources the traffic will utilize. The ISP's performance optimizing may be frustrated, however by a response to its traffic engineering by the users of the network. Typical peer to peer networks and content distribution systems have the property that a user is not concerned about which particular server he/she uses. If traffic to a sever is slowed as a result of traffic engineering, he/she ay break the connection and form a new one with a different sever, if sever selection is implemented by an application the user is running these connections may respond on a much faster time scale than the ISP's traffic engineering.

The ISP's policies may almost never be applied to the intended traffic. In a general overlay network, the change in traffic may be even more drastic as traffic is routes through the overlay network, several different traffic flows in the underlying network may be created. A number of ISP's attempted to decrease their costs due to P2P traffic by restricting it in their networks. Some ISP's deployed traffic shaping devices to limit the sending rates of popular P2P applications they used, while some injected packets to reset the TCP connections used to transfer data between the peers. These techniques relay on identifying the P2P traffic in the network, via the ports it uses or by deep packet inspection; as an effect to avoid identification, P2P systems started to use randomly selected ports and traffic encryption.

XIII. ISPs Network and Overlay Traffic Content Distribution Infrastructure Optimisation

A. ISP's indirect influence on P2P: ISP's apply traffic engineering methods and treat aggregates of certain types of traffic preferentially in order to optimise the quality of service and resource usage in their networks. IP networks using traffic engineering serve a limited number of QOS classes. Traffic Engineering consists of special treatment of traffic aggregates on the basis of their quality requirements, with the goal of improving the QOS AND optimizing the resource usage. Aggregation needs packet inspection, as packet are classified based on their source/destination IP addresses, QOS can be supported by different server, Multi- Topology Routing (MTR), OR MULTI-protocol label switching (MPS). Packets are treated according to their classification and their marking at the domain border. The ISP does not provide any information to the explicitly inform the ISP about their preferred service classes. [5]

As different servers operate on the level of forwarding, Multi-Topology Routing (IETF) performs routing on the basis of the traffic type assigned to a packet. This approach roughly consists of establishing different routing tables for various types of traffic. The goal is to treat preferentially some types of traffic, without affecting the quality of others and to optimize the capacity usage and to perform load balancing within an ISP domain. Finally MPLS assign packet flows to different classes and makes differentiation possible both for forwarding and for routing, since each tunnel has specific path with specified bandwidth and failure recovery method. Traffic engineering does not affect the locality of P2P traffic and consequently does not decrease the Inter-Autonomous system (AS) traffic but TE may refuse the operator's Intra-Domain link loads.

B. ISP's Direct Influence on the overlay: The ISP's performs operations that influences the overlay directly, in such a way that the peers wont' be aware of the involvement of ISP. The goal is to improve the efficiency of the P2P system in terms of network resource usage (e.g Inter –As traffic), such that their own cost decrease. This approach is based on an ISP managed proxy node that influences the operation of the P2P system, such that the peers are not aware of the involvement of the ISP, hence the P2P protocols do not have to be notified. The proxy node may operate in the CONTROL PLANE or Data Plane of the P2P system or even both.

In the control plane: The proxy can influence the peer selection, thus it can redirect a peer's requests for content to local peers that already own the content or it can modify the packets that carry information about possible neighbour's this approach can decrease significant amount of traffic costs, adversity might interfere with security features of P2P protocol.

In the data plane: The proxy can act as a transparent cache intercepts P2P traffic using deep packet inspection and serves the local peers requests for data if already stores in the cache. ISP managed proxy has some limitation on its aim these includes. i) Inability to inspect encrypts P2P files. ii) Installation and maintenance cost and risk of caching copyrighted content.

C. Peer-to-Peer System's Unilateral Involvement: This approach relies on the information obtained by the peers via some measurements, the measurements gives proximity information that can be used in two ways. Thus i) can be used to influence the neighbour selection process. ii) can be used to select the peers in a given set of neighbours with which data is exchanged and hence affecting the overlay routing but not the overlay's to topology itself.

D. Mutual Direct Influence: The approach requires close cooperation between the P2P systems and the ISP's with the common goal of improving the performance of both. The ISP operates an infrastructure that provides information to the P2P systems which have to be modified to make use of the information. The aim is a win-win situation. Ideally the ISP deploys an entity in its network through which it provides information to the P2P system about, e.g. the network topology and the network state. The peers can use the information obtained from the entity in the control plane (e.g. to optimize the peer selection, overlay routing) and in the data plane (e.g. to adapt the transmission rate between the peers). Since the information is provided by the ISP, it is more accurate than the information that the peers would obtain via reverse engineering, at same time the ISP influence the OPTIMIZATION via the information it provides. The most important questions concerning collaboration are how the peer can discover such an entity and what information, the entity should provide the peers... the simplest implement of an entity could provide proximity information about the peers participating in the overlay. The oracle node provides such services by ranking the potential neighbours of every peer on the basis o physical-topology proximity metrics. The information provided by the entity can also include the cost of certain paths in the network as proposes for the P4P portal (IETF). The costs reported to the peers are calculated such that the peers if they make their overlay routing decisions based on them will optimize the underlay's performance according to the criteria chosen by the ISP. Another entity implementation by ISP is on information about the cache existence. If peers prioritize the cache over external peers, then the transit traffic of the ISP decreases, if peers prioritize the cache over local peers, then the cache can be used to decrease the congestion on the last mile up links the question remains how much caches would affect the overall application performance? Nevertheless , in order to support a multitude of P2P systems the discovery of the ISP provided entities and the communication with them has to rely on a standardised application layer protocol or the entities have to be decomposed into an application

specific part and an application independent part, e.g. as in provided by IETF for Application Layer Traffic optimization (ALTO) on service discovery– these approaches provides the greatest potentials for optimization of P2P/ overlay based content traffic through cooperation between the content distributions overlay infrastructure and the ISP network.[5]

XIV. Practical Mechanism and Techniques Which Aim to Harmonise the Relationship between P2P/Overlay Content Distribution Services and Underlay Network

One of the primary objectives of the internet services providers is to manage the traffic which crosses their networks. Techniques are deployed which aims at finding optimal routes from a specific source to a specific destination. In network architecture ISP targets how network application (i.e. Network Resource Consumers) can effectively utilize the network resources owned by network providers. The solutions are proposed to be applied on the network layers (Layer 3) or sometimes on the link layer (Layer 2) and attempt to optimize routing , based on criteria such as latency, link capacity available bandwidth, financial costs of links etc. these are to the best interest of both the ISP'S and their customers. In the current internet for traditional point to part applications, efficient traffic control is largely determined by network providers alone applications specify only the destination of traffic, it's up to the network to control both paths taken by the traffic and the transmission rates through TCP feedback on the chosen paths, specifically providers can use optimal traffic engineering to determine efficient routing and satisfy economical objectives.

In this chapter the most two promising proposed (IETF working group ALTO) Mechanism to harmonize relationship between P2P/ Overlay content distribution and ISP shall be discussed. Thus;

A. ISPs guide P2P clients in the selection of their peers via severs called ORACLE.

B. SIMPLE AND FLEXIBLE framework called provider portal for (P2P) Application (P4P).

XV. The Oracle Technique Approach

This is a type of service provided by the ISP's whose purpose would be to guide the end users of a P2P system in the selection of their peers, instead of selecting this peers at random, a user can forward a list of candidate peers to the oracle.

The oracle ranks the peers and returns the ranked list, the end user can then proceed to choose his peers based on the oracle's recommendation. Since oracle services are being provided by the ISP's, it has access to information on the structure and utilization of the network that can be used during the ranking process.

Oracle, perhaps helps P2P users choose optimal neighbours more precisely, a P2P users ends the list of potential neighbouring peers to the oracle, which ranks this list based on a number of factors that each ISP can decide individually like their proximity to the user or higher bandwidth links or according to its routing policies or its agreements signed with other ISP's. The oracle acts like an abstract routing underlay to the overlay network. The oracle protocol was created by appropriately adapting DNS (Domain Name System). UDP is used as the transport protocol, due to its speed and its stateless nature. There are two main messages of the Oracle Protocol, thus "Query Message" (i.e. message sent by the server to the client which contains sorted IP addresses. The oracle ranks the IP addresses based on the information retrieved from the database. The oracle database contains "static data" (such as the network topology) as well as "dynamic data" (such as link congestion and this requires updates periodically).

Oracle has advantage over other traditional coordinate systems because it does not rely on latency but considers some features like geographical location, the link capacity etc. An oracle can provide an accurate ranking only for those nodes which are located within its anonymous system AS, for nodes that are outside the AS, the oracle tends to first segregate them according to their parents AS's. Node belonging to AS's in the close neighbourhood will be ranked higher than nodes belonging to AS's, moreover, nodes in the immediate neighbourhood can be further classified to nodes belonging to customer ISP's, the disadvantage of oracle could be of the facts, it reveals confidential information about the network topology and performance.

Other Advantage of Oracle Technique Approach

The help oracle reduces the download time for P2P users and P2P users still able to locate the available content with the same probability. Oracle technique increase locality.

Oracle approach maintains its benefits across different user. Its behavioural pattern benefits different network topologies

XVI. The P4P Approach

P4P stands for proactive network provider participation for Peer-to-Peer or PROVIDER PORTAL FOR P2P. P4P is a light–weight architecture enabling explicit communication between P2P (Independently of DHT's) and Network Providers (ISP's) in order to reduce backbone traffic and lower operation costs. The proposal leverages the fact that the ISP is best-positioned to determine locality and to direct clients not only to nearly peers but also to peers that are accessible over well-provisioned and lightly based links.

The P4P framework is based on the same principles as the Oracle approach; it allows cooperation's between P2P users and ISP's towards a solution to the Application Layer Traffic Optimization (ALTO). The P4P framework

consists of three planes: - thus: a) the data plane, b) the management plane C) the control plane.

The data plane is optimal and is concerned with differently and prioritising application traffic. The control planes holds the pioneering functionality of cone P4P and the main entity of this plane is tracker, i tracker provides three kinds of information regarding the network provider; thus network status/topology, provider guidelines/policies and network capabilities with i trackers, the P4P framework seems to be a kind of centralised architecture applying content delivery network (CDN), architecture to a file sharing P2P network.

P4P can be applied both on tracker based P2P systems and in tracker-less ones.

Tracker-based communication system, the prices are as follows: The end user requests with the application tracker.

The application tracker queries the I-tracker and determines the peers for the end user taking into account the I-tracker's recommendation as well as the application requirements. The application tracker notifies the end user of the peers that it has recommended.

In tracker-less system, the end user would have to interact directly with the I-tracker, and I-tracker provides the following three interfaces.

A. The policy interface: - this interface relays the usage policies and the guidelines of the network.

B. The capability interface: - this interface allows peers or content distributors to request capabilities that are offered by the ISP's.

C. The P4P-distance interface: this the pillar of P4P framework through this interface the application can ask for an evacuation of the intra- and inter-domain links of the network. The P4P distance or P- distance are acting cost values assigned to the network links and reflects the ISP's assessment of these links. The higher the P-distance, the less the ISP favours traffic forwarding over the corresponding link. P-distance can be determined on the basis of variety of parameters such as OSPF weight , BGP preferences, link utilization, financial cost of the links, congestion metrics etc.

XVII. CONCLUSION

The emergence of peer to peer (P2P) has posed significant new challenges to achieving efficient and fair utilization of network resources in particular, without the ability to explicitly communicate with network providers, P2P applications depend mainly on inefficient network inference and network oblivious pearly leading to potential inefficiencies for both P2P application and network providers, as discussed IETF working group which consists of ISP's, P2P companies and researchers has tremendously worked on the proposed mechanism (thus oracle and P4P technique) to address standard s and harmonise relationship between P2P/overlay content distribution service and the underlying network. ALTO problem could be resolved to an extent, if the proposed new network model is designed so as to facilitate content exchange, it is undeniable that rebuilding the internet is a very challenging and ambiguous task, it's always not very easy convincing the internet community to adopt new trend no matter how promising the techniques are, nevertheless, it would be of great advantage and harmony seeing the above mentioned approaches soon employed in today's inter-networks.

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I was born on the 8th day of March, 1985.I hail from Adazi-ani town in Anaocha Local Government Area of Anambra State, Nigeria.

I am a wholehearted Electrical and Electronic Engineering professional, trained information technologist who enjoys service delivery, I love leading and working within a team capable of demonstrating motivation towards meeting deadlines and performing effectively under pressure. I aim to achieve success and greatness through professional competency and ensure optimal returns on organizational resources.

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