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Introduction of Distributed Services Network
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Status of this Memo

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Abstract

This draft briefly introduces DSN,a Distributed Service Network proposed by China Mobile in ITU-T as the evolution of NGN.PPSP is a protocol DSN plans to develop to support streaming services in future Internet.

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1. Introduction

DSN[1],the abbreviation of Distributed Services Network, is a new question being standardized in ITU-T proposed by China Mobile. The first DSN conference was held on January 11th to 23rd,2009 in ITU-T SG13 plenary meeting in Geneva. Two work items, DSN scenarios[2] and requirements[3] of DSN capabilities were approved to set up in current stage. In ITU-T DSN is defined as the evolution of NGN which uses distributed technologies such as P2P to rebuild the core network with lower CAPEX/OPEX and more flexible application support to suit with mobile Internet and FMC development. Therefore it's important to introduce DSN in related STDs like IETF and 3GPP to accelerate NGN/NGI development. PPSP can be used in DSN for p2p streaming applications.

2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

2.1. DSN

DSN is the evolution of NGN driven by p2p technology which provides distributed, operatable and managable characteristics to support more carrier's grade rich multimedia services beyond current NGN scope.

2.2. Core node

Core node refers to the DSN node deployed in service provider domain, e.g. DSL/Wireless access and aggregation network, IP/MPLS core, etc.

2.3. User node

User node refers to the DSN node in user domain, e.g. PCs, mobile terminals, etc.

3. DSN architecture

DSN focuses on overlay network layer, which may belong to application-layer in ISO/OSI model. The traditional Internet is a dumbbell structure, which places most of the intelligence in the terminal system and leaves the network as simple as possible. Along with overlay network introduced in the migration of internet, it stresses more intelligence in the middle of the network. To make it clear for designers, we divide this layer into several sub-layers as follows:

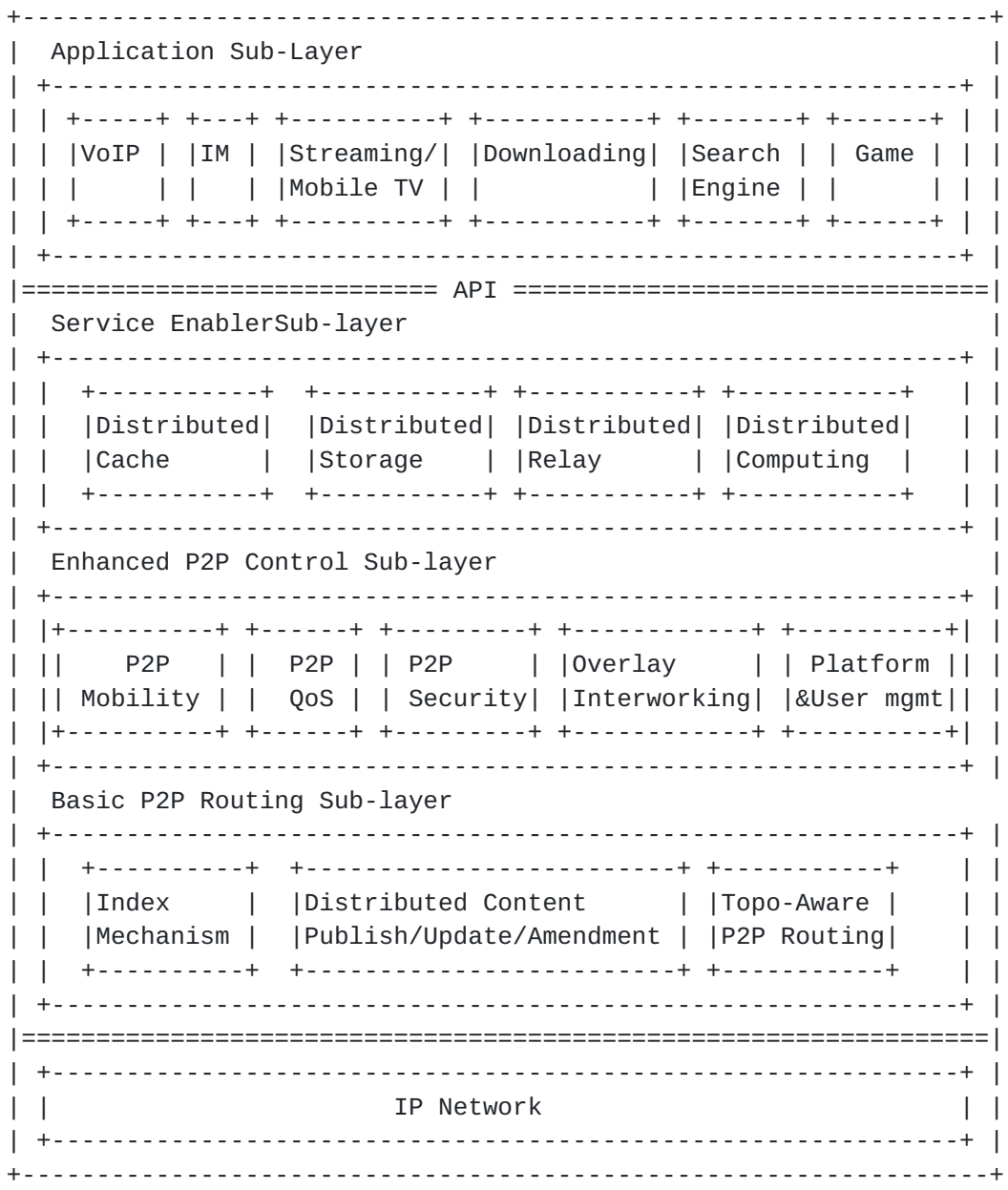

Figure 1 DSN Architecture.

The bottom in the overlay layer is Pbasic p2p sub-layer where basic p2p functions are involved e.g.,index mechanism, distributed content publish/update/amendment and topology-aware P2P routing.

The second is the enhanced p2p control sub-layer where some additional management and control functions for the basic p2p network

are developed such as mobility in p2p,QoS mechanism based on p2p

technology, different p2p system inter-working and distributed management functions to monitor the p2p system running condition and individual nodes.

The third is service enabler sub-layer, which is the basic components to develop applications. They can also be used jointly. For example, VoIP uses distributed relay module and streaming uses distributed cache and storage module where gaming uses both.

Atop is application sub-layer where DSN operators open API to expose network capability to both self-run applications and 3rd applications.

4. DSN Scenarios[4]

DSN applies the P2P technology to provide operators with reduced CAPEX/OPEX, improved scalability/ubiquity, self organization/maintenance and fault tolerance.

DSN enables the core architecture of wireless Internet with the combination of P2P technology and other distributed technologies. With DSN, carriers are able to build scalable telecom network platform that deliver multimedia applications and content applications. In DSN application system, the following services are enabled:

4.1. Service Scenarios

4.1.1. Multimedia telephony services

With DSN, carriers can build cost effective and large scale MMTel service system.

Compared with existing MMTel system, DSN's service control node is named as core node who collaborate with each other in a peer to peer paradigm. There is no central server for session processing.

Core Nodes compose of a P2P overlay which has its own addressing and routing mechanisms. Users are registered in different Core Nodes in the P2P overlay. Core Nodes communicate with each other by exchanging the application routing information.

Since there is no central server, a single node failure will not cause system failure. When parts of the nodes are not available in the system, other nodes can continue to provide services as an entire system with the organization of P2P technology without any impact from the unavailable hosts.

It is unnecessary to configure the added hosts specifically, instead it only requires that the application layer supports P2P related protocols in the system, and the system will be expanded automatically. All the application layer addressing and routing information are communicated by P2P protocols without manual configuration. And system capacity can be enlarged by adding new Core Nodes even by using user equipment as it can also runs Core Node functions.

In a complicated IP environment, end to end QoS is hard to realize because congestion may happen along the media path, "Best of effort" feature may ignores the service requirements of real-time applications such as MMTel. With DSN, a peer acting as a relay node can be inserted to the media path to enhance the performance of real-time service. The relay mechanism can also provides good NAT traverse capability, which allows users to access high quality service after NAT.

4.1.2. Streaming services

Streaming services become more and more popular in current Internet. Conventional C/S model suffers from performance bottleneck and poor scalability when the number of streaming service subscribers keeps growing. Operators thus would have to maintain the service quality by deploying more and more streaming servers, which increases their CAPEX/OPEX of the network. While in P2P mode, each user acts as a peer that not only downloads the streaming content but uploads the content to other users, thus effectively reduce the burden of streaming server and improve the scalability of streaming service.

Streaming across different network domains may cause increased network traffic where a network domain usually means a subnetwork with peers having the vicinity in network topology (e.g. same LAN, same service PoP). Therefore, it is important for DSN to realize traffic localization.

4.1.3. Content distribution service

DSN enables very large data storage and content delivery with the help of p2p overlay distribution network. In P2P-enabled system, network resources are distributed across peer nodes. Users can provide and obtain resources and data simultaneously. Such features make it easier for very large data storage. For carriers, these features allow maximization of edge network resources and reduce the load of the server. For users, the new technology provides a richer resource and a faster resource-sharing channel.

The Content distribution network based on DSN should closely combine with underlying routing and the transmission mechanism to realize the optimization of traffic.

4.1.4. Large-scale High Bandwidth Multi-media Service

Bandwidth exhausting multimedia service in the future may become the killer application. However it has higher requirements on the network bandwidth and node processing capability. These applications have very high requirements on the carrier network: Presence system requires 3-10M network bandwidth, less than 100ms delay, and 10ms jitter, and also have high requirement on route setup process as well as QoS. DSN intelligent routing mechanism provides routing function for the system, and provides QoS guarantee for large capacity multimedia service on the basis of P2P bandwidth aggregation capability.

4.2. Carrier Deployment Scenarios

For the real deployment of DSN, it can be classed into private network-based deployment and Internet-based deployment for different applications from the perspective of carriers.

4.2.1. Carrier private network-based Deployment

Carriers can deploy DSN in the mode of private network. Private network deployment means deploying DSN on the carrier's private network, e.g. IP private network of China Mobile. DSN serving modes are deployed on the private network of carrier, which can NOT be accesses from Internet. They deliver services in a trusted environment, and DSN network will provide the required high security and manageability. This deployment mode, however, only optimizes the serving nodes of its owns compared with the deployment in Internet environment, without maximizing the resources in Internet environment. Private network-based DSN can provide traditional telecom service, including basic voice/video call, supplementary services, value-added service and IM communication, it also provides service interface for future new services (e.g. VoIP service, content delivery, real-time file download and large-capacity multimedia service etc.) with enhanced service capability. Private network-based DSN can interact with traditional telecommunication networks via gateway.

4.2.2. Internet Deployment

In this mode, DSN node can be deployed over Internet, or services provided by DSN node can be accessed from Internet. DSN node on Internet includes the equipment of carrier and also a large number of

user nodes on the Internet. The sufficient resources of Internet can be better utilized, which will drive the carrier to reduce the network deployment cost. In addition, DSN allows the diversity of services. With the service interface provided by carriers, a number of practical service modes will emerge in the open Internet environment. However, a lot of DSN service nodes on the Internet may be the users nodes, whose security and stability can not be guaranteed, and increase the difficulty to control and manage network. Internet-based DSN can help carriers converge Internet service and address the service mode shift from voice to data. Internet-based DSN can also interact with traditional telecommunication networks via gateway.

5. Relationship between DSN and PPSP

As shown in last section, p2p streaming and other content services are important types in DSN. Therefore we need a uniform p2p streaming protocol run among core nodes and user nodes. It can also be used when there are multiple DSN implementations which can be inter-worked each other for streaming service.

6. Security Considerations

The motivation of this draft is to introduce Distributed Service Network (DSN). We don't consider security issues in this draft.

7. References

7.1. Normative References

[1] ITU-T DSN, Proposed scope of DSN, http://www.itu.int/md/meetingdoc.asp?lang=en&parent=T09-SG13-090112-C&PageLB=50.

[2] ITU-T DSN scenario, Initial draft of supplement Y.dsnscen Supplement on DSN scenarios, http://www.itu.int/md/T09-SG13-090112-TD-WP5/en.

[3] ITU-T DSN requirements,Initial draft of recommendation Y.dsnreq "Recommendation on DSN requirements", http://wwwtu.int/md/T09-SG13-090112-TD-WP5/en.

[4] DSN whitepaper,unpublished.

7.2. Informative References

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