

Telecommunications and Information Exchange Between Systems

ISO/IEC JTC 1/SC 6

Document Number:	N14025
Date:	2009-06-10
Replaces:	
Document Type:	Other Document (Defined)
Document Title:	Proposal to discuss an Initial New Work Item on “Standardization on Managed Peer-to-Peer (P2P) Framework & Protocol”
Document Source:	SC 6/WG 7 Tokyo Meeting
Project Number:	
Document Status:	For your information.
Action ID:	FYI
Due Date:	
No. of Pages:	15
ISO/IEC JTC1/SC6 Secretariat Ms. Jooran Lee, KSA (on behalf of KATS) Korea Technology Center #701-7 Yeoksam-dong, Gangnam-gu, Seoul, 135-513, Republic of Korea ; Telephone: +82 2 6009 4808 ; Facsimile: +82 2 6009 4819 ; Email : jooran@kisi.or.kr	

6N14025
7TOK-11

Title : Proposal to discuss an Initial New Work Item on “Standardization on
Managed Peer-to-Peer (P2P) Framework & Protocol”

Source: Korean Expert (Sung Hei Kim and Shin-Gak Kang)

This document proposes to discuss about possible future new work item on Standardization on Managed Peer-to-Peer (P2P) Framework & Protocol”. This document is submitted for discussion to the joint meeting of the ISO/IEC JTC 1/SC 6/WG 7 which is held in Tokyo, June 2009.

1. Discussion

This contribution proposes to initiate work in new work item “Standardization on Managed Peer-to-Peer (P2P) Framework & Protocol”. The P2P(peer-to-peer) is a very popular service which enables end-users to share data and resources. The popularity has caused P2P traffic to consume over 70% of Internet resources from the year 2006.

Various standardization activities have recognized this problem and have initiated standardization to overcome part of this problem. However, the problem of P2P is that it is user based, thus, P2P service is not manageable nor is provided with efficiency to the network. New P2P service needs to be defined which is controllable and provide efficiency in the network. This contribution proposes to initiate new work item to standardize managed P2P by controlling P2P service through management from P2P service perspective. The proposed work is to define framework and protocol through research in characteristics and features of P2P services.

2. Proposal

The proposal is in the attached file.

ISO/IEC JTC 1 SC 6 WG7

Proposal of New Work Item

Standardization on
Managed Peer-to-Peer (P2P)
Framework & Protocol

Sung Hei Kim and Shin-Gak Kang

ISO/IEC JTC 1 SC 6 WG7

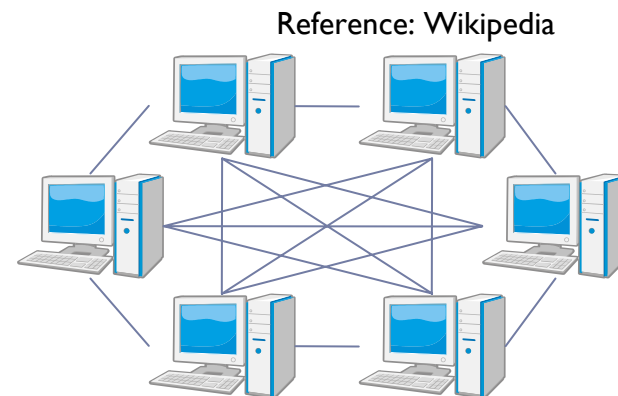
Proposal of New Work Item

Standardization on
Managed Peer-to-Peer (P2P)
Framework & Protocol

Sung Hei Kim and Shin-Gak Kang

About Peer-to-Peer (P2P)

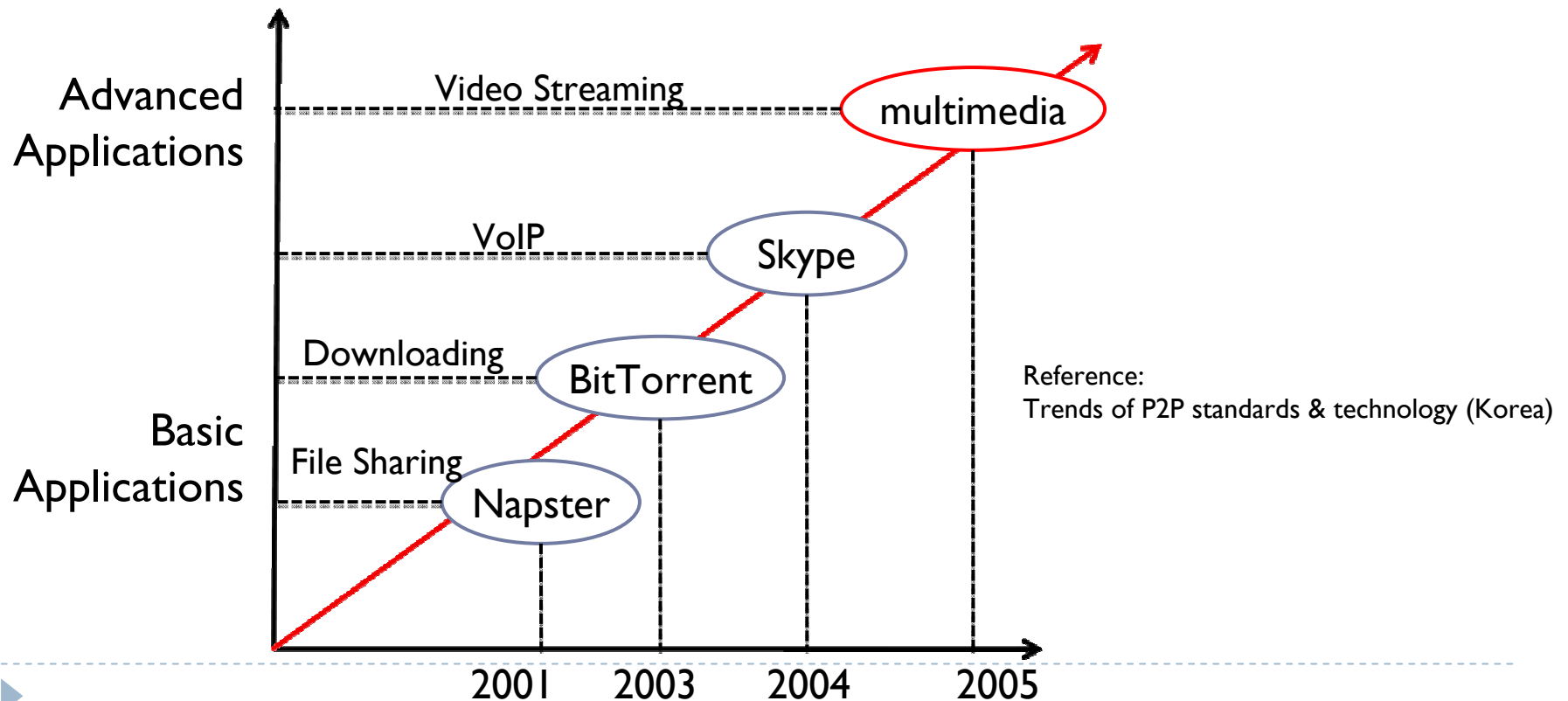
- ▶ Definition from Wikipedia
 - ▶ Diverse connectivity between participants in a network and the cumulative bandwidth of network participants
- ▶ Characteristics of P2P
 - ▶ Distributed Resource Sharing
 - ▶ Use any resources distributed throughout the network
 - ▶ Peer share resources (data, applications, computing power, connectivity, presence) information
 - ▶ Contents based routing
 - ▶ Distributed Self-organization
 - ▶ No more bottleneck in the server
 - ▶ Decision on shared resource by peer
 - ▶ Self-organization through Ad-hoc



About Peer-to-Peer (P2P)

► Applications

- File sharing & download: Napster, Gnutella, KaZaA, BitTorrent
- Video distribution: Afreeca, Pandora TV, Daum TV Pot, CoolStreaming, PPLive, GridMedia



Pros & Cons of P2P

▶ Pros

- ▶ Resilient to failures & network dynamics
- ▶ Unlimited network bandwidth (donated by participants)
- ▶ Easy deployment without a network support
- ▶ Good scalability with distributing loads to participants
- ▶ **Users share variety of contents/resources**
 - ▶ major reason for high popularity

▶ Cons

- ▶ High churn
 - ▶ Frequent join/leave of users cause P2P service instability
- ▶ Network dynamics
 - ▶ QoS are dependent on the access network capacity
- ▶ Selfish participants
 - ▶ User tends to limit(minimize) uplink bandwidth



Technical Challenges of P2P

- ▶ **Overlay efficiency**
 - ▶ Overlays at application layer (Routing layer functionality is duplicated)
 - ▶ Various approaches: Tree-based vs. Mesh-based vs. Hybrid
 - ▶ None completely overcomes dynamic peer-to-peer environment
- ▶ **Incentive mechanism**
 - ▶ Must have incentive for contributing end users
 - ▶ Users in streaming services stay for shorter times
 - ▶ Hard to build reputation and apply incentive mechanism
- ▶ **Global or local topology adjustment**
 - ▶ Adjustment cause service disruption, quality degradation
 - ▶ Adjustment should be performed at minimum cost
- ▶ **Extreme peer dynamics and flash crowd**
 - ▶ Large increase in the number of users joining broadcast in short period of time
 - ▶ Large number of users leaving broadcast during short period of time
 - ▶ Results in lack of service reliability and robustness
- ▶ **Implementation issues**
 - ▶ Security, NAT/Firewalls, and Transport protocol (TCP or UDP or TFRC) problem



Limitation on P2P

- ▶ **Lack of information about underlying networks**
 - ▶ Impossible to configure efficient network path
 - ▶ Network path are not shortest path.
- ▶ **No guarantee on QoS**
 - ▶ End user cannot support/guarantee QoS
 - ▶ P2P path tends to visit several end users (access network)
 - ▶ Various P2P service needs high bandwidth, low jitter & end-to-end latency
- ▶ **Lack of reliability**
 - ▶ High possibility of path disconnection from high churn
 - ▶ Network status changes frequently from extreme peer dynamics and flash crowd
- ▶ **Network load concentration on specific nodes/networks**
 - ▶ Resource are not evenly distributed throughout the network
 - ▶ Impossible to predict traffic flow
 - ▶ Need load balancing on resource
- ▶ **Security concerns**
 - ▶ Many shared contents contain viruses, worms, Trojan horses, and spyware
 - ▶ Exposure of personal information



Limitation on P2P (2)

- ▶ Lack of ISPs' control on traversing traffic
 - ▶ P2P is an overlays at application layer, thus filtering P2P packet is intensive task
 - ▶ Explosive increase of P2P traffic cause damage to other ISP services
- ▶ Social problem
 - ▶ Infringement of copyright: Free sharing of music & movie titles
 - ▶ Susceptible to fraud, spam, virus, etc.
 - ▶ No control on access: Minors easily access adult contents.
- ▶ What shall we do?
 - ▶ Should we block P2P traffic? **No!**
- ▶ P2P is emerging as a major paradigm, that is P2P business is growing
 - ▶ ISPs should try to solve P2P problem
 - ▶ ISPs should participate in P2P business
 - ▶ ISPs should find efficient method of controlling P2P traffic and services

Resolution: Managed P2P

- ▶ What to do??
 - ▶ Secure popular content
 - ▶ Open infrastructure: traffic regulation, security, accounting
 - ▶ Guarantee QoS
 - ▶ Easy content search and access, caching widely used data
 - ▶ Redirect traffic to more efficient networks
 - ▶ Provide P2P service with manageability !

- ▶ P2P service provided by dedicated service nodes(ISP node)
 - Managed P2P

- ▶ Managed P2P
 - ▶ Benefit for ISPs
 - ▶ Reduce overall network traffics
 - ▶ Control network resources
 - ▶ Improve overall performance
 - ▶ Benefit for users
 - ▶ Use of more secure, efficient, and convenient P2P service

Standardization activities on P2P

- ▶ **Networking architecture**

- ▶ **IRTF P2P RG**

- ▶ Taxonomizing & survey of the use of P2P applications (no activity)

- ▶ **IRTF SAM RG**

- ▶ Scalable and adaptable multicasting architecture with P2P, IP multicast, and overlay multicast

- ▶ **Network management**

- ▶ **IETF ALTO WG, P4P**

- ▶ Traffic optimization with peer selection and discovery

- ▶ **Applications**

- ▶ **IETF P2PSIP WG**

- ▶ Distributed SIP management over a P2P network

- ▶ **SPEERMINT WG**

- ▶ Session peering for multimedia interconnect
 - ▶ Inter-provider/Inter-domain peering



Proposal

- ▶ **Standardization work needed**
 - ▶ Need to define managed P2P service for ISPs
 - ▶ Need to define interoperability on P2P service between domains
 - ▶ Need to define interaction with the contents provides
 - ▶ Need to define overall structure/framework for managed P2P
 - ▶ Need to define efficient method to provide key managed P2P services

- ▶ **SC6 initiative on new technology (Managed P2P)**
 - ▶ Define problem of the current Managed P2P
 - ▶ Define efficient method to manage and control P2P services
 - ▶ File Sharing & Download Service
 - ▶ Real-time Video streaming

Expected Work

- ▶ **Initiate work on framework for managed P2P**
 - ▶ Define problem & issues of “unmanaged P2P”
 - ▶ Define service requirements and scenarios
 - ▶ Define core technology needed for managed P2P
 - ▶ Define structure for managed P2P to efficiently manage P2P
 - ▶ Define high-level interoperability between domains

- ▶ **Initiate work on protocol for various Managed P2P services**
 - ▶ File Sharing & Download Service
 - ▶ Real-time Video streaming

Tentative work item for Managed P2P

- ▶ **P2P architecture**
 - ▶ Addressing & naming of resource and peer
 - ▶ Service management (Delivery management)
 - ▶ Analyze & report
- ▶ **Resource management**
 - ▶ Storage, search, discovery
 - ▶ Dynamic reconfiguration
 - ▶ Copyright management (delivery control)
- ▶ **Peer management**
 - ▶ Peer selection
 - ▶ Contents/service aware routing
 - ▶ Load balancing
- ▶ **Networking**
 - ▶ QoS
 - ▶ Traffic optimization
 - ▶ Reliability, robustness
 - ▶ Uplink utilization
- ▶ **Security**
 - ▶ Authentication & Anonymity
 - ▶ Resource & service Protection

