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NAGA P2P Livecast System
VJLIVE

Technical Papers

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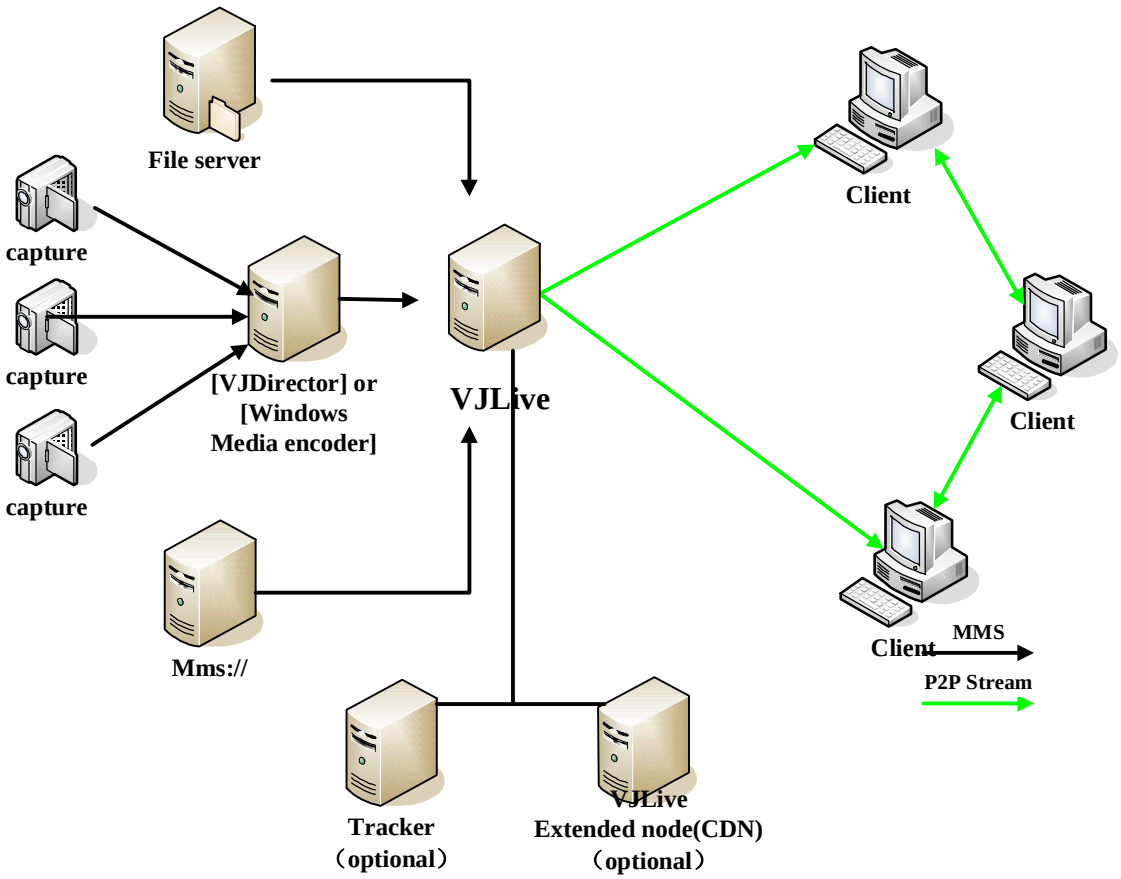
1/System object

Traditional Broadcast system has high requirement for hardware and bandwidth. It needs to spend more bandwidth if it wants to support more people. Companies need to spend a lot for such expensive system, and individuals can not afford for that. The main objective of our system is to decrease the dependency of hardware and width requirement for broadcast applications by P2P technique. By using our system, in a certain bandwidth, if more people involving in, the media stream will be more fluent. As a result, the cost for hardware and bandwidth can be significantly decreased. This will save a lot of money for companies. Individuals can also have their own broadcast servers. The broadcast system exist previously are so complicated that only professional people can build it. On the contract, we provide a very simple way to do that, even people don't know much of broadcast system can have their own system by themselves.

2/Application framework



(1) There are three type of data source for VJLive

media files from local server or remote server, it could be MMS、HTTP, streaming, WMV, RM,RMVB,MP3,FLV,WMA

Data streams from VJDirector or windows media encoder

HTTP,MMS streaming from windows media service

(2) VJLive uses UDP port 5000 to 6000 to communicate with server which uses UDP Port 3502. So UDP port from 5000 to 6000 and 3502 should be allowed in firewall

(3) The main object of VJLive is to try our best to save bandwidth with high quality of streaming. The end user is prior to try to get data from other users by P2P technique. By this way, bandwidth requirement for the original source could be decreased.

The following table is the requirement for bandwidth in VJLive(all date calculated is based on 500kbps broadcast bit rate)

Number of sample	Bandwidth requirement for traditional systems	Bandwidth requirement for VJLive	Bandwidth saved
200	100Mbps	10Mbps	90%
1000	500Mbps	20Mbps	96%
>10000	>5Gbps	<=70Mbps	>99%

Remark: the date above is just for reference, there might be difference in actual environment

(4) Adjustment for delay .Delay and utilization of bandwidth can be adjusted in VJLive. The delay can be less then 30s.

(5) Hardware requirement

For broadcast sever that has 8 channels with 500kbps bit rate:

CPU: p4 core2 2.8G

Memory: 2G

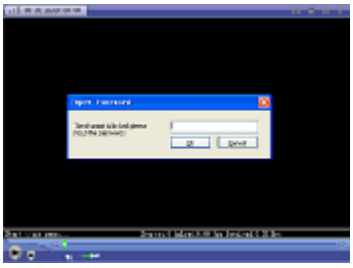
Bandwidth: 100m

OS: windows 2003 server

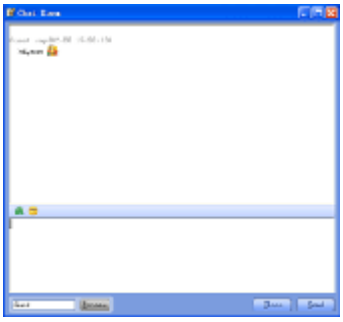
3/FUNCTIONS DEMO:

Advertising:

Encryption

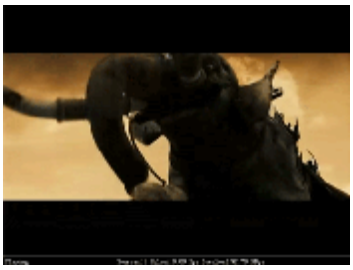


Chat (include expressions)



Full UI pattern

Simple UI pattern



Mini UI pattern

Other UI style

4/SOFTWARE FEATURES:

(1)Performance Advantages:

[P2P & NAT through & UDP transfers]Ultra-high bandwidth saving rate, two clients can be embodied P2P effect.

[Intranet support] Can be installed in either internet or intranet

[Video source] Support WMV / WMA / ASF / FLV / RM / RMVB / MP3 file formats, MMS / HTTP live streaming.

[Video Rate] From SD to HD.

[Deployment] Large-scale deployment of flexible structure, like CDN network, one channel can setup on different servers at the same time.

[Control] Adjustable bandwidth cost during broadcasting

(2)Features:

[Chat] Chat with expressions.

[UI] Customizable interface style. (More see Secondary Development Document)

[Manage] Online Statistics, source switching etc.

[Televiewe] Support ActiveX, and can be integrated in an application.

(3)Business functions

[Advertising] Support flash / text / pic.

[Encryption] Can set password on different channel.

[SDK] see SDK.

(3) software cooperation:

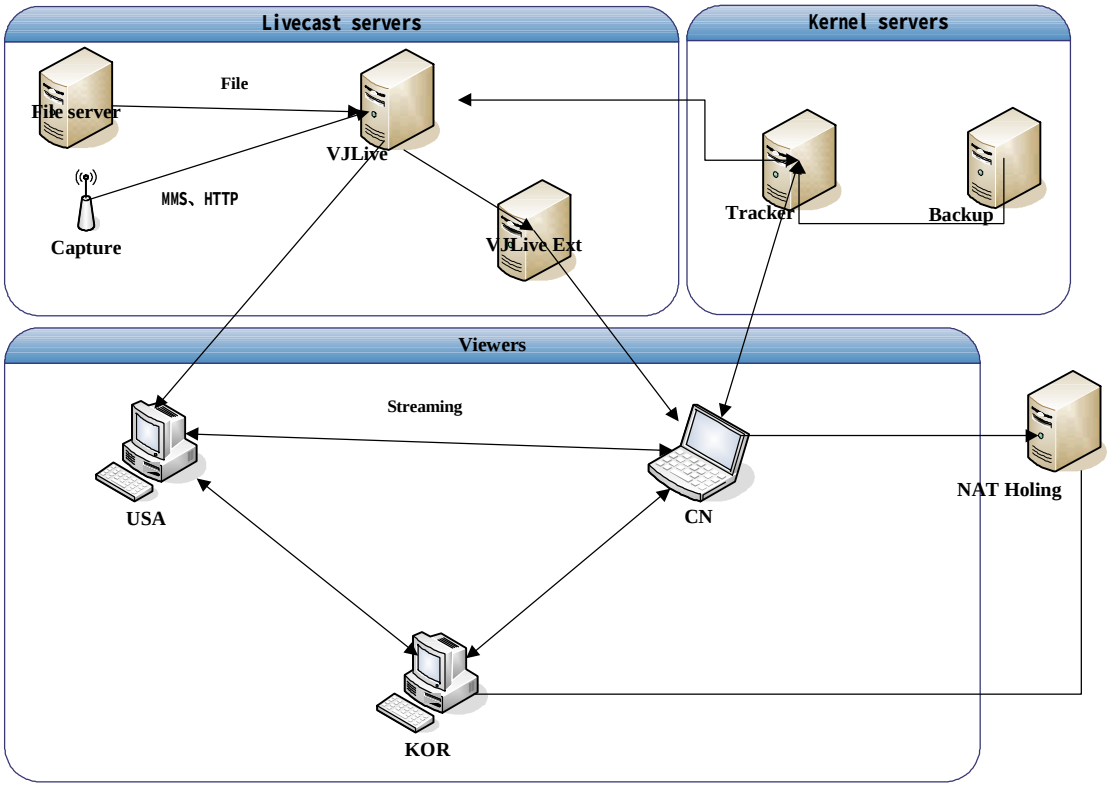
VJLive cooperate with VJDirector: VJLive can cooperate with VJDirector. Feature like subtitle,logo,flying subtitle, real-time scene transfer etc will present on broadcast media. This makes VJLive a professional broadcast system. VJLive uses the same web player as VJVOD, As a result, the end user can use the same web player for both broadcast and VOD.

VJLive cooperate with windows media services : traditional broadcast can be updated to p2p directly. VJLive can play real-time streams from remote machines, it can use the output stream of windows media encoder as an input directly, no repeaters is needed.

5/Technique framework

(1)P2P network topology

VJLive P2P organizes nodes in form of network structure. In such topology, one node can connect to several notes at the same time. This will make VJLive p2p connections stronger. Strong ability of NAT crossing ,topology adaptive and bandwidth saving are main of feature of VJLive p2p topology .



(2)Products

VJLive systems:

Broadcast publish software(VJLive)---- publish video stream

Web player---------- play video stream

Manage software (Tracker)---------- manage nodes: logon in/out, registration, authorization etc

Authorization system ---------- authority user use of channels

Super-node Management system(VLIVE EXT)----------splitting video stream, optimizing stream forwarding

Control and Surveillance system-------- monitor performance of VJlive

Other module ---------- user chat module, advertise publish module, safety module(Encryption)

6/Technical Features

(1) Modular and Extensible

NAGA Live System provides SDK for the server module and watch control module, including, but not limited to:

PROPERTIES :		
ID	Name	Remark
1	Nat	Nat server address

2	Stun	Stun server address
3	Cgi	Track server address
4	Action	format: VJLIVE:type=live&cid= VJVOD: cid=&hash=&mime=&size=&bitrate=
5	OutPlayerId	Outer player ID (Reserved)
6	PlayMode	full,mini (just a video window), simple (video and statusbar)
7	FullScreen	Full screen control, default is false
8	AutoPlay	Default is true
9	BufferAD	Buffering flash url
10	AutoChatPop	Default is false
11	EnableChat	Default is true
12	EnableNameCookie	Enable read name from cookie, default is false
13	CookieFormat	Format:url|cookie name
14	Position	Play position (just for vod)
15	Volume	Volume
16	Mute	Mute
17	StateString	State string.
18	Duration	Duration, (s)
19	CurPlay	Current play position, (s)
20	EnableContexMenu	Enable contex menu, default is true
21	StartDelay	Start delay, 1s~30s, just for live.
22	StopAD	When user press stop, display a flash.
23	BufferTime	Buffering time before starting play. Default is 0.
24	FlvPlayer	Flv player url, the player must provided by us.

25	InfoString	Information string.
26	OrgSize	Enable cache data of Vod, default for false.

Method:		
ID	Name	Remark
30	Open	Run action
31	Play	Play
32	Pause	Pause
33	Stop	Stop
34	Close	Stop action
35	PopPlaylist	Popup playlist dialog
36	PopChat	Popup chat dialog
37	ChangeVideoSize	Change video size.

(2) **NAT Holing**

The users who in the LAN of company or area can start listening services for the network and they may upload and download data from others at any time. ***(Because of technical problems, the holing from Symmetric NAT to Symmetric NAT is invalid. But rarely Symmetric NAT currently used, and no mature industry through technology, it is not taken into account.)***

(3) **Improved UDP Network Transmission**

It uses UDP protocol as the transmission technology, self-open and package MUDP and SRUDP protocol. SRUDP is a reliable UDP protocol and MUDP is UDP protocol for high speed.

(4) **Automatically Optimize Bandwidth**

Bandwidth optimization assessment algorithm module: Testing the user real-time bandwidth with the IP address of the access list for the nation, gain the evaluation results of all linked peer, and then adjust network dynamically and start optimizing

compensation algorithm.

(5) **Multiple Redundant Error Correction Algorithm**

Multiple redundant error correction algorithm: A subcontractor for convection, a small amount of redundant data. Because it is based on UDP transmission, so in the network of packet losing circumstances, it enables users to see the images as many as possible of error recovery of some data.

(6) **Double Buffering**

The platform uses double-buffering to cache data. Firstly, at the network layer, the data packets are buffered to detect the next packet and to statistic the dropout rate. According to the results, it can pre-read the data, and based on the corresponding data for the new sub-block operation, and pre-recovery operations (including start-up compensation strategy and pre-compensation the data). Secondly, at the media layer, the media data received will be sorted and optimized and allowing users in the high dropout rate can see some smooth screen.

(7) **Support All Common Media Format**

Streaming Media Module building on the system registered codecs, assemble and optimize the vast majority codecs, and provide a reunification of the input-output interface. It can support MP3, RM, RMVB, WMV, ASF , FLV format and so on. Without required of streaming file, network transmission and real-time playback are valid. (The platform does not include the corresponding codecs, so the users should install them by themselves. For example, install Windows Media player and Real Player. Because of supporting for a variety of codecs, it can be the same platform as the carrier of Audio Broadcasting).

7/Software Module Features

(1) Media Module

Introduction: media modules mainly for the media encoding, decoding, and can generate a data stream for network transmission.

Function: Supports all common file formats (rm/rmvb/wmv/asf/flv/mp3…),and also supports mms/http/rtsp.

(2) Network Optimization Module

Introduce: Optimization Module is designed base on the user habits and the global network bandwidth differences.
It is an optimization algorithm functional package.
Function: Redundant transmission components: for packet loss statistics and error recovery, QOS guarantee. Peer allocation components: According to online time, the host, network bandwidth, may at any time can select a reliability and stability peer.

(3) Network Transmission Module
Introduction: Transmission method.
Function: Using UDP protocol, include NAT holing(gateway penetration).We developed RUDP(Reliable UDP protocol) and SUDP(smart UDP protocol) ourselves. It supports smart and reliable transmission for application.

(4) Network architectures
Introduction: Base on BLAST STREAMING(NAGASOFT Patent) P2P network architectures.
Function: Peer fluctuations will not affect other peers, peer has independent maintenance function, and it will regular search other peers to optimize the link. Fluctuations on the entire network can promptly responds, guarantee the stability of the structure. Structure supports super node, you can setup a CDN network for each channel.

(5) Buffer modules
Introduction: Memory cache algorithm and strategy.
Function: A number of related memory pool, used for media data storage. Optimized memory blocks release and the fastest recovery of memory allocation, real-time calculation of statistical information.

(6) Framework
Introduction: The application program structure
Function: Multi-thread/modularization structure, fastest processing speed, low CPU usage, SDK supported.

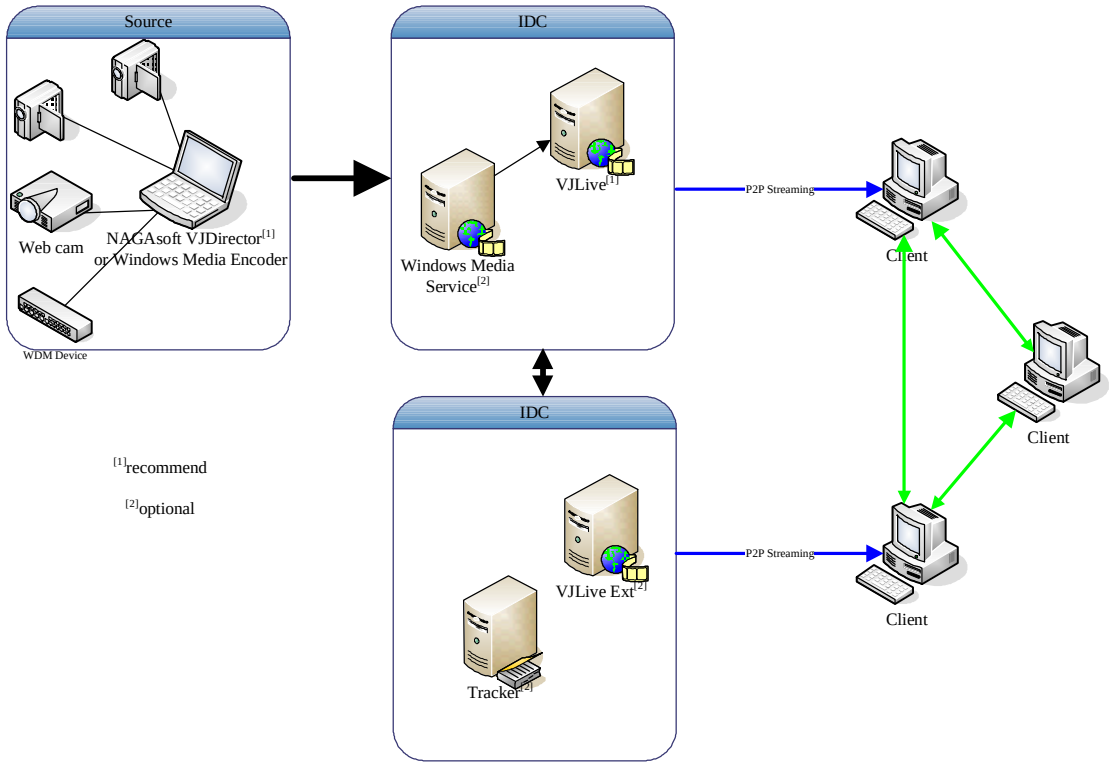
8/Software requirement

	software
Client	Win2000/XP or higher, Windows Media Player 9.0、Directx9.0 or higher, RealPlayer
VJLive server	Windows2003 or higher, Windows Media Player 9.0,Directx9.0 or higher, RealPlayer
P2P net manage	FreeBSD4.1 or redhat9 or windows

server	2003,MYSQL5.0,Apache2.0

9/APPLICATION SCOPE

(1)Live/Device cast



[1]recommend

[2]optional

(2)File/remote cast