# A Study on a Design & Implementation of Internet Broadcasting System

2001    2

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2001   2

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**2 0 0 1**      **2**

Abstract

# Abstract

This paper presents the design and implementation of University Internet Broadcasting system for moving picture realtime broadcasting and VOD broadcasting service.

In order to achieve these purpose, program planning, construction procedure, realtime broadcasting transfer module and VOD broadcasting module are described.

This paper is describe by following order. First, we studied on preference of use by internet user for broadcasting name, program plans bearing and plans strategy. Second, we implement broadcasting system for internet transfer.

Third, homepage of broadcasting station is simple for providing a user with convenience. Fourth, we compose best-effort of audio and video encoding, transmission speed for providing a user with good program.

For the condition gratification of this paper, we constructed and transmitted speciality education program for distinction betw -een University Internet Broadcasting and other internet broad- casting of contents.

This paper is composed of 5 chapters. Chapter 1 describes the historical background and goals of this work, outline of re- maining chapter. Chapter 2 describes the internet broadcasting of concept and general purpose of use by internet user. Chapter 3 describes the design and implement of University Internet Broad -casting station and each modules of it. There describes the

program planning and construction. Chapter 4 describes the design result of contents and program planning. Chapter 5 summ -arizes all results obtained in chapter 2, 3, 4 and includes the further research topics and the work to be supplemented.

# 1

## 1.1

(Internet)

( , )

. (Encoding)

.

(VOD : Video On Demand) .

, , , ,

[1].

VOD

.

.

1.2

VOD

.

.

,

.

,

(Master Control Room),

.

,

,

(Micro-
soft)　　　　　(Power Point)　　　　　　　.

,

(Windows Media Encoder Se-
ver)

(ADSL : Asymmetric Digital Subscriber Line)

(Cable Modem)

.

,

,

.

.　2

· . 3

· ,

· · ,

,

· .

, VOD

. 4

5

·

,

VOD .

## 2

### 2.1

, Streaming Media,
Webcasting, Pointcasting, Internet Broadcasting        .
Webcasting    ,              (WWW :
World Wide Web)              (                              )
.

,
.

#### 2.1.1

'95

'95    10    KBS(Korean  Broadcasting  System)

, MBC(Munhwa  Broadcasting  Coporation)

'96    2    ,        SBS(Seoul Broadcasting System)    EBS(Edu-
cation  Broadcasting  System)              .

TV

VOD

.

TV,                        (Major)

'96    12    ( )              (www.hite-

ch.co.kr)　　　　　　　　　　　2

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　,

　　　　　　　　　　　　　.　　　'97　　1　　　　　　　　　　(www.korea

-twin.com)　　　"　　　　　　　　　　"　　　　17

　　　　　　　　　　　　　　　　　　　　　　　　.

　　　　　　　　　　　　　　　　　　　　　　　　　　　　,

　　　　　　　　　　　　　'97　　7　　　　　　　(Mega-Media)　　M2-

station(Mega Media Station)

　　　　　　　　　　.

　　　　　　　(Animation),　　　　　　　　(Entertainment),

　　　　　　　　M2station　　　　　　　　IMF(International Mone-

tary Fund)　　　　　　　　　.

　　　　　　　.

　　　　　[1].

　　2.1.2

　　　　　　　　　　　TV　　　　　　　　　　　　. TV

　　　　　　　　　　　　　　.

　　　　　　　　　　　　TV

　　　　.

2.1.3

1. VOD

　　　　　　　　　　　　　．

　　　　　　　　　　　　．

2.

　　　　　　　　　　　　．

　　　　　　．

　　　　　　　　　　　，　　　　　　　　　　　　(Push)

　　　　　　　　　　　　　　　　　．

3.

　．　(Push)

　　　．

. (Streaming)

[2].

2.1.4

.                                                                            ,

.

.                                    PC                              1:1

,

.

24

.

.

,

,                            ,

.

[2].

## 2.2

### 2.2.1

350                                                                        .

KBS, MBC, SBS,                              ,                    T V

.              (Digital)                                (Analog)

.

### 2.2.2    (    )

.

.                                                                                ,

(Channeli), M2station, T V21,                                                  ,

,

(Venture)                                        .

2.2.3

.

(Netizen)

.

,

.                                        ,

.                                              .

,

VOD                                                              .

,

.

2.2.4

.

NBC(National Broadcasting Com
-pany)                 MSNBC,

Cnet,

W-vision,                          CNN(Ca-
ble News Network)                    , 20              (Fox)

Foxnews, ZDTV(Zweit
-es Deutsches TV), FR3(France3),        ABC(Asutralian Broadca-

sting Corporation) .

[1].

## 2.3

350 ,

300 ,

, , - (Plug-In) .

.

### 2.3.1

. 20.7%,

· · 8%, 23.5%, · ·

6.1%, · 1.7%, 8%, 9.4%,

11.3% < 2-1> .

, ,

[2].

### 2.3.2

.

64.5% < 2-2>

,        ,                                                          [2].
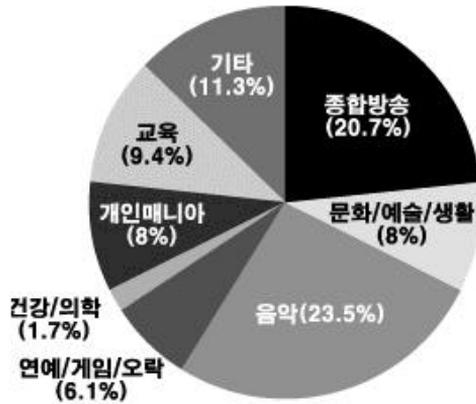


2- 1.

Fig 2- 1. Distribution of Broadcasting Genre
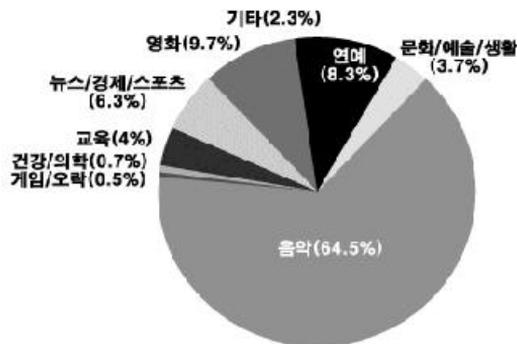


2- 2.

Fig 2- 2. Distribution of Contents

2.3.3

<                  2- 3>

56Kbps(Bit  Per  Second)                                                     .

56Kbps                          36.9%                              300Kbps

        128Kbps                                    .

                                                                    [2].


    2.3.4          -


                              <      2-4>                                  -

              '99                      90%                     (Real pl

- ayer)          -          . 2000                              (Media

player)           -

              .

                    (Flash), VIVO,                    (Liquid Player)

                    [2].
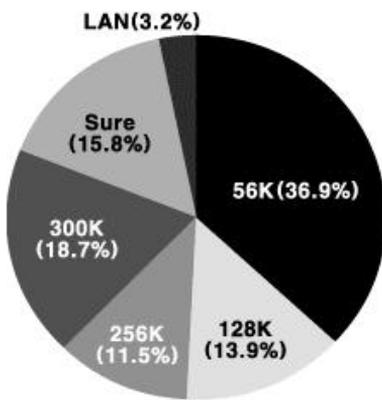



                2- 3.                                    2- 4.        -
        Fig 2- 3. Transmission Speed              Fig 2- 4. Plug- In
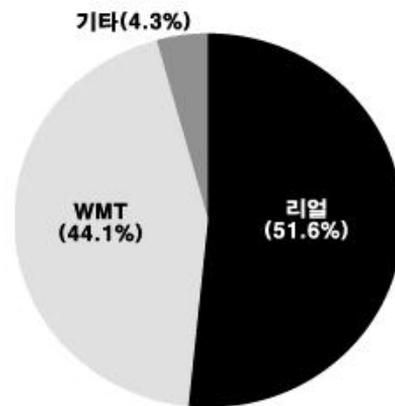
# 3

## 3.1

### 3.1.1

　　 ·　　　 ·

2000　 2　21 　 - 2　27

　　　 ·

　　　　　　　　　　　　　　　　　　　　1

(Domain)

,　　　　　　　　　　　　　　　　　　　　　 <daehak

-internet.com>　　 <ktitv.com>

Network Solutions　　　　　 ·　　　　　　　　　　　　　　 ·

### 3.1.2

1.

　　　 ·

343

136 ,           207

.

2.

<      3- 1>

51.9%,

14%              ,     ,                          <      3- 2>

10        7                                    .

3- 1.

Table 3- 1. Ranking of purpose by computer use

| | |
|---|---|
| | 5 1.9 |
| | 14.0 |
| | 12.5 |
| | 8.2 |
| | 6 .1 |

3- 2.

Table 3- 2. Use of Internet

| | |
|---|---|
| | 77 |
| | 19.5 |
| | 3.5 |

<      3- 3>

34%,                      ,      ,              ,

63.4%,          20.

2%,       9.0%    <     3- 4>                              .

<

3- 5>                              38.8%                      ,

<      3- 6>                          68.2%

.

Table 3-3. Looking for Site by Internet

| | |
|---|---|
| | 34 |
| | 17.0 |
| | 16.3 |
| | 10.5 |
| | 7.2 |
| | 6.5 |
| . | 4.5 |
| | 1.3 |
| | 0.7 |
| | 2.0 |

Table 3-4. Purpose of use by Internet

| | |
|---|---|
| | 63.4 |
| | 20.2 |
| | 9.0 |
| | 2.2 |
| | 5.2 |

Fig 3-5. The program desired

| | |
|---|---|
| | 38.8 |
| | 17.4 |
| | 16.1 |
| | 6.0 |
| . | 4.3 |
| . . | 2.7 |
| . | 2.7 |
| | 1.3 |
| | 1.0 |
| | 10.1 |

Fig 3-6. A correspondence course whether attend or not

| | |
|---|---|
| | 68.2 |
| | 31.8 |

.

.

3.2

3.2.1

．

．

1

．

，                                                                        1

(One Man System)                                ．

1

．                                                                ．

，              ，              ，              ，              ，

，

，                                              2 1

，      ，

．

3.2.2

1.                  (Web Producer : Web PD)

，                                      ，              ，

．

2. (Web Master)

VOD

(Stream Server), VOD , (Encoder
Server) .

3. (Web Designer)

,

.

4.

,

.

5.

.

3.2.3

．

21

，　　　，

．

，　　，

1　　12

(　　2　　)

VOD　　　　　　．

1.

．

．

．

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2.

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3.

&lt;

3-7&gt;                                    .

3-7.

Table 3-7. Weekly Basic Program Form

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 07:00 07:45 | 1 | | | | | | | |
| 07:45 07:55 | Click Fitness | | | | | | | |
| 07:55 08:45 | 2 | | | | | | | |
| 08:45 09:05 | | | | | | | | |
| 09:05 09:10 | | 21 | | | 21 | | | |
| 09:10 09:50 | 3 | | | | | | | |
| 09:50 09:55 | | | | | | | | |
| 09:55 10:35 | 4 | | | | | | | |
| 10:35 10:45 | Click Fitness | | | | | | | |
| 10:45 11:25 | | | | | | | | |
| 11:25 11:45 | | | | | | | | |
| 11:45 11:50 | | | | | | | | |
| 11:50 16:30 | 1 | | | | | | | |
| 16:30 19:35 | 2<br>1.            1<br>2.            2<br>3.            3<br>4.            4<br>5. | | | | | | | |

&lt;     &gt;

4

1                    2

12        30                              .

- 19 -

3.2.4

.

.

1.

·      ·       ·                ·

·

<       3- 1>

·                 ·

1

2

.



3- 1.
Fig 3- 1. Contents Planning Chart

2.

&lt;    3-2&gt;

.
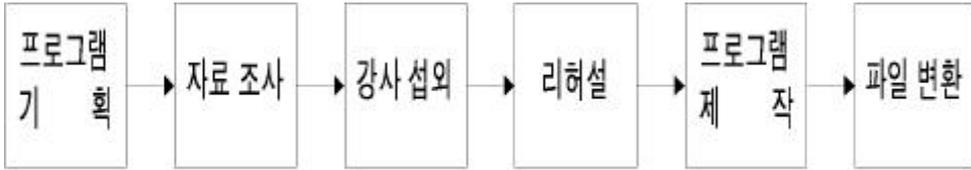


3-2.
Fig 3-2. Contents Construction Flowchart

3.

VOD

&lt;    3-3&gt;    .



3-3.            VOD
Fig 3-3. Real Time Broadcasting & VOD Service

## 3.3

### 3.3.1

50

,

<                    3-4>                            .
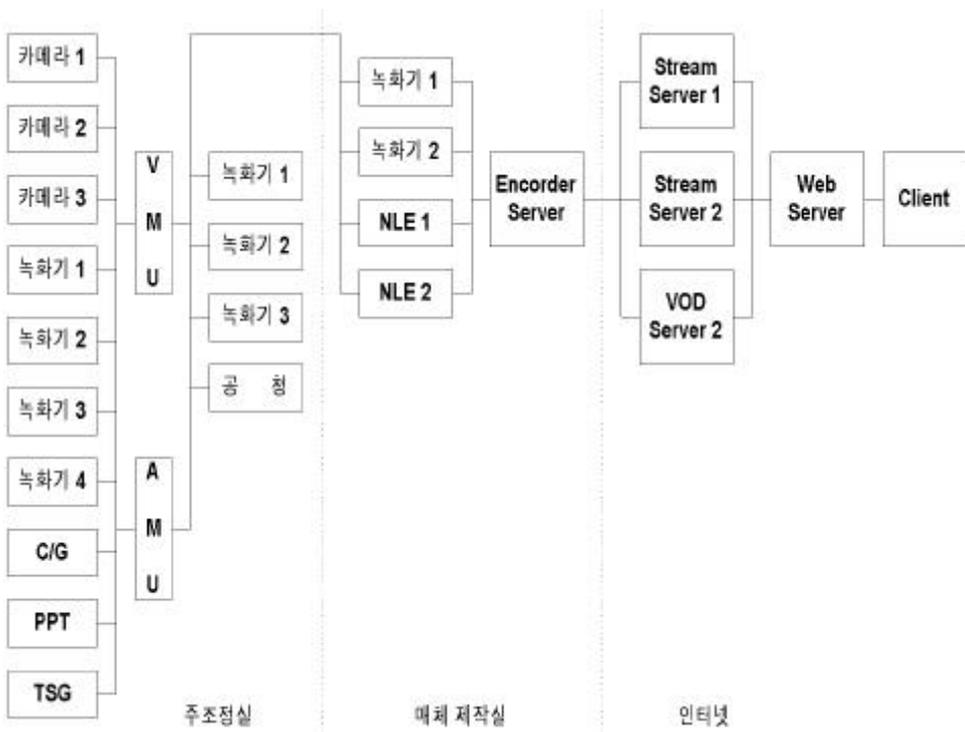


3-4.
Fig 3-4. System Architecture

3.3.2

  1.

(Video Switcher),
    (Mixing Console),        ,        ,        ·

  .

  .              (Video Switcher)

              (VMU : Video Mixing Unit)              <
3-5>                          ,
                        .              (Control Panel)
  (Main Unit)                                        ,
(Rack)              .



3-5.
Fig 3-5. Video Mixing Unit

                        (Video Source)

  (Input)              A , B

- 23 -

M/E (Mix/Effect Bus)            .                    (Fader Lever)

(Mixer),            /      (Fade In/Out),          (Dissolve),
(Superimpose)                                        (Gate Amp-
lifier)                (Key Signal)                  (Internal Key)
(Chroma Key)                .

(Wipe)                     .

(Vertical Blanking Time)

(Noise)

.                                        (DVE : Digi
-tal Video Effecter)

.

VMU                                ,            (VCR : Video Casse-
tte Recorder),            (Character Generator)
VMU

.              (Sync)    ,          (Blanking)    ,
(Subcarrier)                                        $4V_{P-P}$,
$2V_{P-P}$                                    ,
(Impedance)        75      .
(Crosspoint)                    1V                (Composite Video)
0.7V                (Component Video)            [3] [5].

.            (Mixing Console)

(Microphone,                    )
(Speaker)

.

(Drive)

.

(Power Amplifier)

.

<    3-6>                          (Mona-
ural)                  (Channel Input Module)

2              (Stereo)

.



3-6.

Fig 3-6. Audio Mixing Unit

4, 6, 8, 12, 16, 24, 32                          4

8                                                    .

(            )

(Grouping)            2 - 8                1 - 2

.

(Odd Number)        L

(Left)          ,    (Even Number)            R(Right)

.

[6]  [7].

.

T V                                                                          <

3- 7>                        (Head)          (Lens),          (Prism),

(Filter)                        (Vidicon),          (Plumbicon),

(CCD : Charge Coupled Device)

,                    ,              (Electric Beam)

(CCU : Camera Control Unit)

(Remot)                    .          T V              T V              ,

,                                                        [5].

.          (VCR : Video Cassette Recorder)

T V

.                              Ampex          2

(VTR : Video Tape Recorder)                        (Herical Scan)

C          1  VTR        -          (U- matic) VCR

.          80                    1/ 2                                        (MII)

(Betacam)          VCR

.                              <          3- 8>

VCR                                                                          T V

[5].

- 26 -

3-7.

Fig 3-7. Studio Camera



3-8.

Fig 3-8. Video Cassette Recorder

.    .

(VAD : Video Distribution A-
mplifier),

(ADA : Audio Distribution Amplifier),

/              (

A/D Converter, D/A Converter),                            ,

(Character Generator),

.                            (Waveform  Monitor)

(Vector Scope),

(Intercom System),                                            .

2.                .

.

.

<        3-9>, <        3-10>
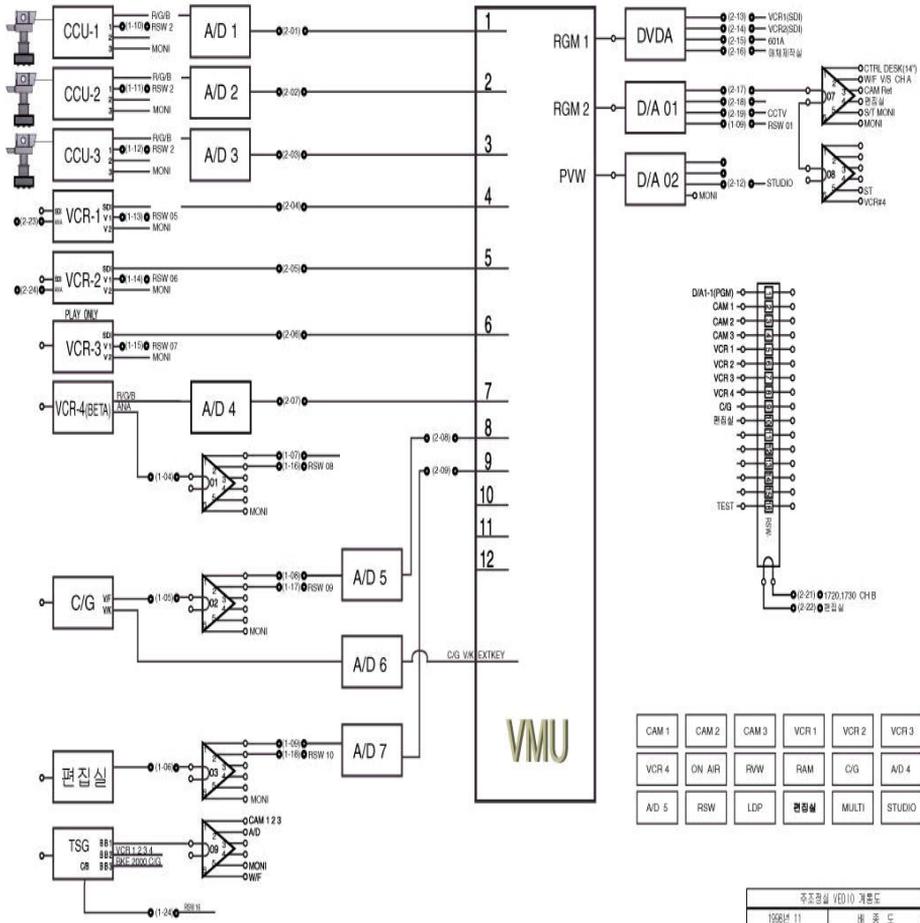
3-9.

Fig 3-9. Master Control Room Video Blockdiagram
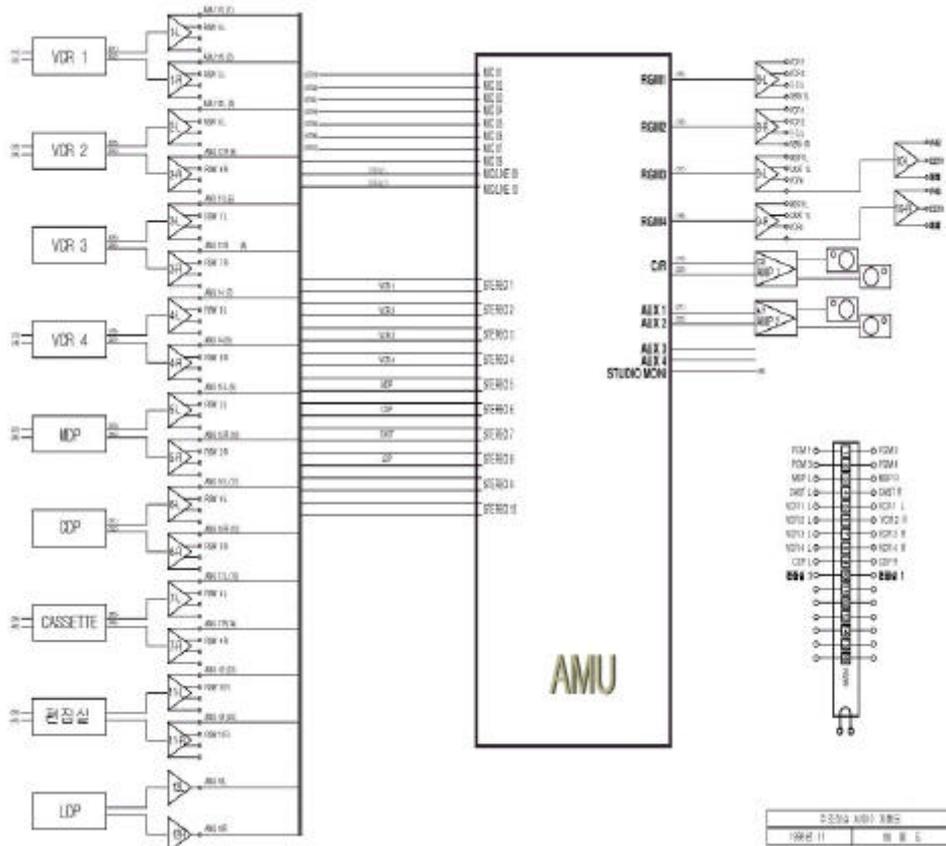
3- 10.

Fig 3- 10. Master Control Room Audio Blockdiagram

3.3.3

　　1.

(Non - Linear Editing System)

G2(RealServer G2),

(Windows Media Server), (DVCAM : Digital

Video Camcorder)

,

.                                    G2,

.

VOD                              .

.

2.

,                          ,

,        ,        ,

<

3- 11>                    .              [3],[7].
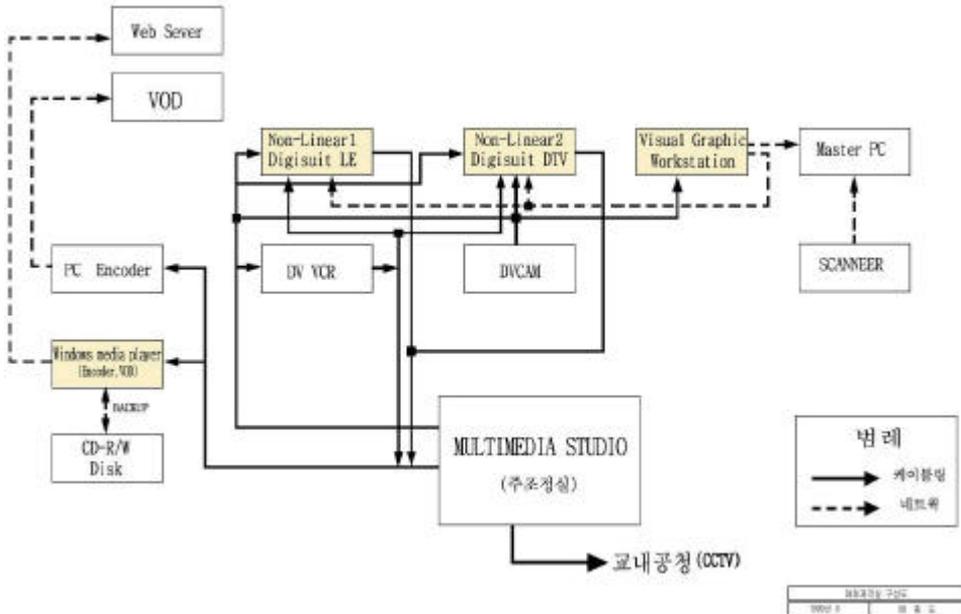


3- 11.

Fig 3- 11. Media Production Blockdiagram

3.3.4

1.

,                                      ,

.      ,

VOD

(Pop-Up)

.

.

.

(Cybertic)

[9] [12]
.

.

<    3-12>

.

3- 12.

Fig 3- 12. Broadcasting Homepage

.

< 3- 13> , ,

. <

3- 14>

.
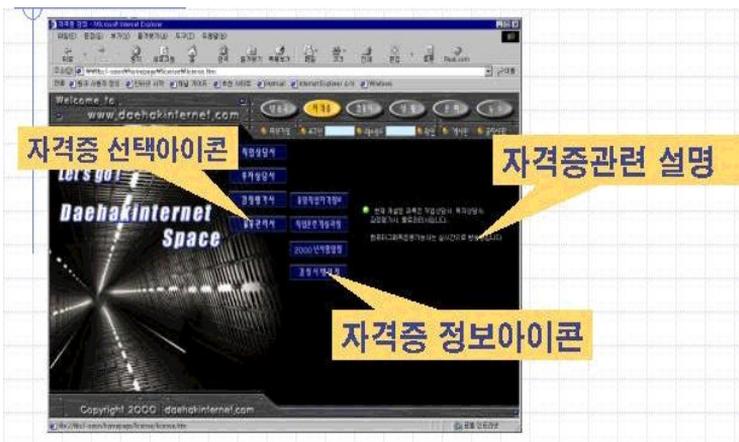


3- 13.

Fig 3- 13. License Chair Homepage

3- 14.

Fig 3- 14. Computer Chair Homepage

·        ,

<       3- 15>                      ,             , <       3- 16>

.



3- 15.

Fig 3- 15. Culture & Information Homepage

3- 16.

Fig 3- 16. News Homepage

.

VOD          <      3- 17>

,
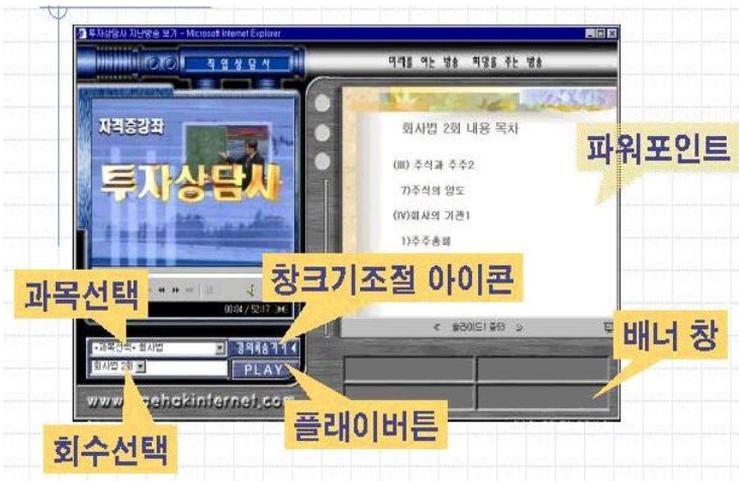


3- 17.            VOD

Fig 3- 17. Powerpoint synchronous in VOD Homepage

2.             VOD

         .

                         VOD

                                    <        3- 18>

                     .



VCR(주조정실)
컨텐츠 자료 제공

Encode Server

Web Server

연코드 송출

서버간의 자료
전송 경로

Switch/HUB

Streaming Server

Router

스트리밍
서버 송출

각각의 사용자에게
직접 송출

클라이언트
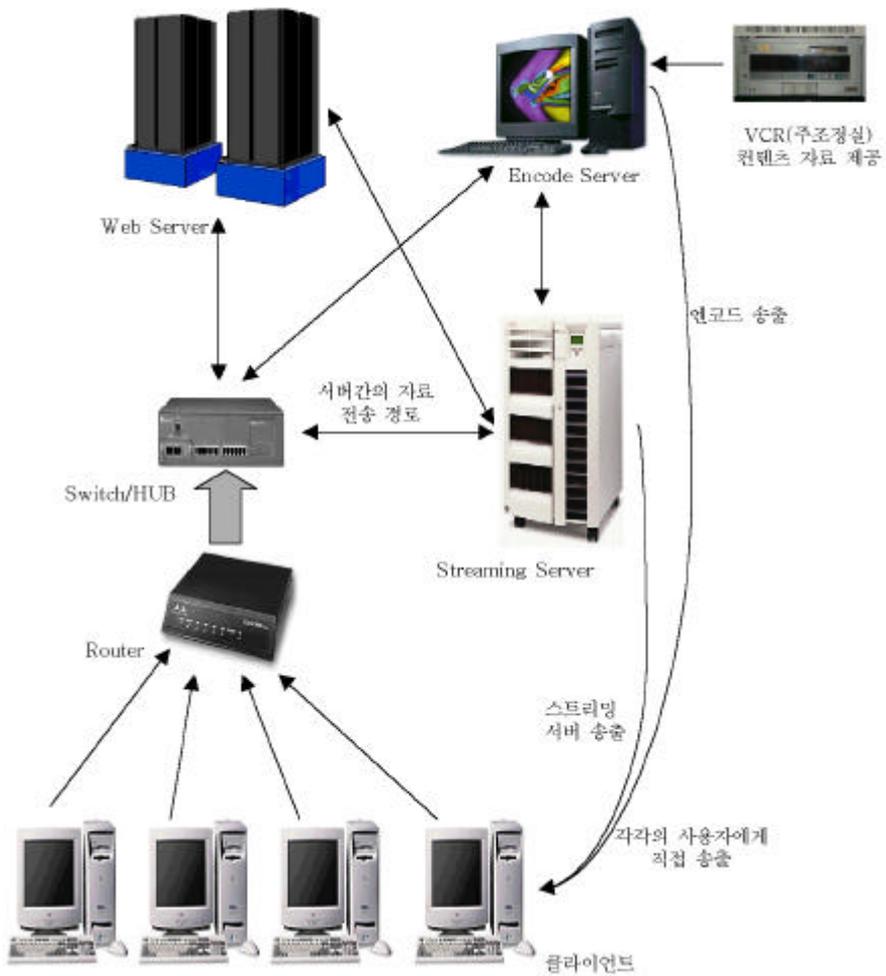
3- 18.
Fig 3- 18. Web Server & Stream Server Blockdiagram

.

(1)

&lt;

3- 19&gt;                    (Super Computer)                .



사양 : IBM RS/6000 SP2
Number of Processors : 27 (Nodes)
Processor Type : P2SC(Power2 Super Chip)
Memory : 4.096 GB, Disk : 201.7GB

3- 19.
Fig 3- 19. Web Server

(2)

VOD

&lt;      3- 20&gt;          .



사양 : Compaq Proliant 5500, 펜티엄 xeon 500*2 512 캐쉬
RAM : 1GByte,  HDD : 100GByte,
FORE ATM네트웍 카드

3- 20.
Fig 3- 20. Stream Server

(3)

VOD

<                 3- 21>                    .



사양 : LG-IBM M-Pro,

펜티엄 III 550*2, RAM : 512MB, HDD : 9GB

3- 21.
Fig 3- 21. Encorder Server

3.4

3.2

&lt;     3-22&gt; ,                    &lt;     3-23&gt;                        .



3-22.
Fig 3-22. Master Control Room



3-23.
Fig 3-23. Media Product Room

3.5

3.5.1

1.

IT (Internet Technology)

<

>, <          >, <          >, <          >, <          >, <

   >, <          >, <          >, <

>, <7·9          >                    <          >,

<          >

VOD                    .

2.

<

>,                    <          >,

<          >

<

   >                    .

VOD          .

3.

21C

,                                                ,


VOD                                    .


3.5.2


1.


                                                                            1

<    3-8>                 2        90                                                    1

        45                                                1              40                        45

                                                                    15

                                                                            .


        3- 8.

Table 3- 8. Cyberuniversity Chair Program

|  | ( ) | ( ) |
|---|---|---|
|  | 45 | 2,025 |
|  | 45 | 1,800 |
|  | 90 | 3,825 |


2.


                                                                        43   ,                        31

        ,                        30   ,                        25            4                                    <

3- 9>

VOD                                    .

3-9.

Table 3-9. License Chair Program

| | ( ) | ( ) |
|---|---|---|
| | 43 | 1,940 |
| | 31 | 1,550 |
| | 30 | 1,200 |
| | 25 | 1,120 |
| | 129 | 5,810 |

3.

·  <    3-10>

12                        226    3,290

VOD

·

3-10.          ·

Table 3-10. Culture & Information Program

| | ( ) | ( ) |
|---|---|---|
| . | 33 | 1,320 |
| | 8 | 160 |
| | 27 | 540 |
| | 6 | 120 |
| | 9 | 180 |
| | 8 | 160 |
| | 24 | 240 |
| 21 | 12 | 60 |
| | 11 | 55 |
| | 10 | 50 |
| | 3 | 30 |
| | 75 | 375 |
| | 226 | 3,290 |

4.

<   3-11>                    ,

                                                                        8

                          .

   3-11.
Table 3-11. Special Program

|  | ( ) |
|---|---|
|  | 20 |
| - | 40 |
| - | 80 |
| 21 | 30 |
|  | 45 |
|  | 120 |
| -Comdex China 2000 | 30 |
|  | 120 |
|  | 60 |
|  | 545 |

# 4 장                          VOD

## 4.1

### 4.1.1

1.                    Administrator                     <    4-1>

_____                            .
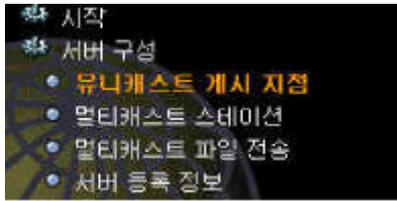


4-1.

Fig 4-1. Unicast Publishing

2.

<    4-2>                                                    (

)    _____

.
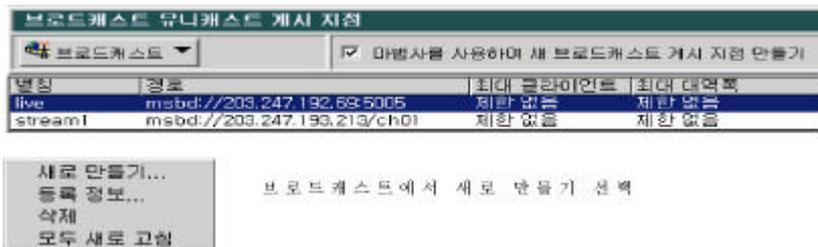


4-2.

Fig 4-2. To make New Broadcasting Publishing Point

3.

<　　4-3>

.



4-3.
Fig 4-3. To make Broadcastin Publishing Point

4.                          <　　4-4>

.



4-4.
Fig 4-4. Input Source Check

5. < 　4-5> Windows Media

,                            , Path

. Windows Media Encoder            Port box

Windows Media Encoder

(MSBD : Media Stream Broadcast Distribut-

ion protocol) .

별칭: [                                        ]

　　　예: LiveEvents

경로는 Windows Media 인코더를 가리키는 URL입니다. 예로 'Media1' 컴퓨터에서 실행하
는 Windows Media 인코더의 경로는 'msbd://Media1'입니다. 인코더가 7007 이외의 포트
에서 스트리밍 중이면 그 포트를 지정해야 합니다. 또한 이 경로를 지정할 때는 MSBD 또는
HTTP 프로토콜을 사용합니다.

경로: [ msbd://                                ]　　포트: [ 7007 ]

　　　예: msbd://Encoder_machine_name
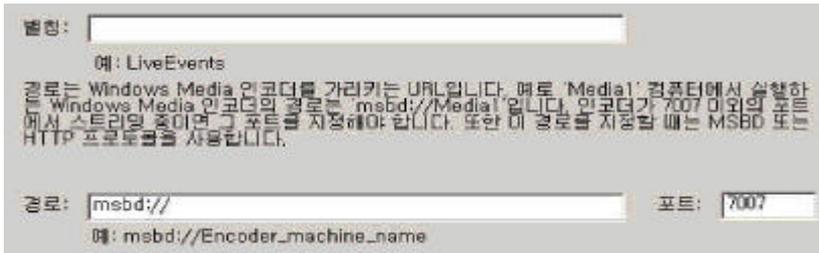
4-5.

Fig 4-5. Path Set-up

6. 　　　　　　　　　　　　　　< 　　4-6>

　　　　　　　　(Option)　　　　　　　　　　　　.

다음 URL을 사용하여 Microsoft Windows Media Player에서 이 브로드캐스트를 액서스하십시

[ mms://MEDIADMIN/live                              ]

프로토콜: ⊙ MMS  ○ MMS-UDP  ○ MMS-TCP  ○ HTTP　　[ 서버 변경 ]

주의: 'MMS'를 선택하면 UDP부터 TCP와 HTTP까지 자동 롤오버를 사용합니다.

사용할 게시 옵션 선택:

☑ ASF 스트림을 가리키는 .asx 파일을 만듭니다.

☐ .asx 파일에 연결하는 <HREF> 태그를 가진 .htm 파일을 만듭니다.

☐ Microsoft Windows Media Player용으로 <EMBED>와 <OBJECT> 태그가 들어 있는
　.htm 파일을 만듭니다(이 .htm 파일은 표준 브라우저와 호환됩니다).

☐ <HREF> 구문을 Windows 클립보드로 복사합니다.

☐ <OBJECT>와 <EMBED> 구문을 Windows 클립보드로 복사합니다.

주의: '복사' 옵션을 둘 다 선택하면 모든 태그가 클립보드로 복사됩니다.

4-6.

Fig 4-6. Protocol & Option Set-up

7. 　　　　　　　　　　　　< 　　4-7>　　　　　　　　　　　　　　.

　　　　　　　　　　　　　　　　　　　　　　.

선택한 옵션은 다음과 같습니다:

아래와 같이 정의된 경로로 'live' 게시 지점을 만듭니다:
　　msbd://encode:7007

.asx 파일은 아래 URL 참조로 만듭니다:
　　mms://MEDIADMIN/live
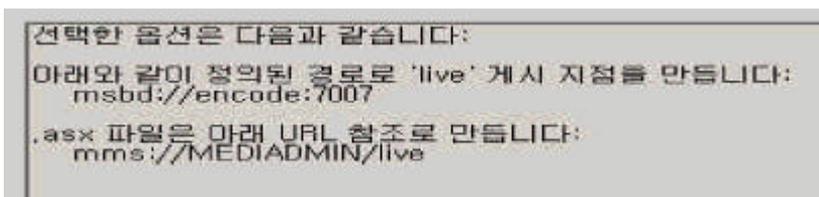
4-7.

Fig 4-7. The result of Set-up

8.　　　　　　　　　asx file, .htm files 　　　　　 < 　 4- 8>

URL 　　　(Uniform Resource Location Test), ASX

< 　 4- 9>

[15],[16].
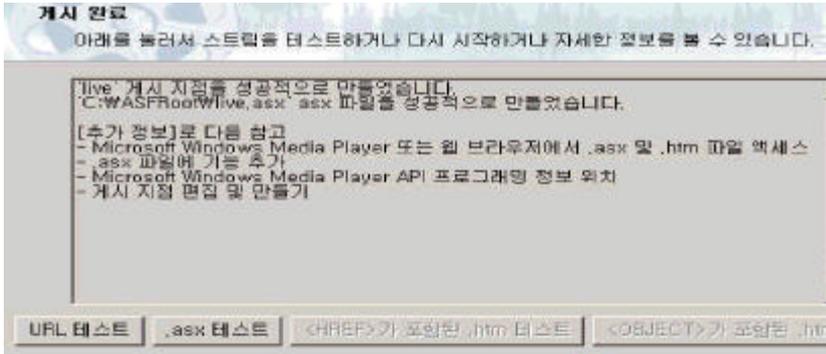


4- 8.

Fig 4- 8. The Last Publishing



1.URL,ASX 테스트　　2.HREF 포함 .htm테스트　3.OBJECT 포함 .htm테스트

4- 9.

Fig 4- 9. Test Picture

4.1.2 VOD

1.                     Administrator                               <      4- 10>

.
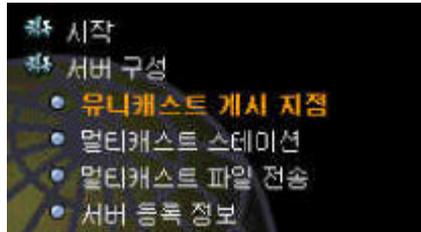


4- 10.

Fig 4- 10. Unicast Publishing

2.                                                      <

4- 11>                                                           (         )

.
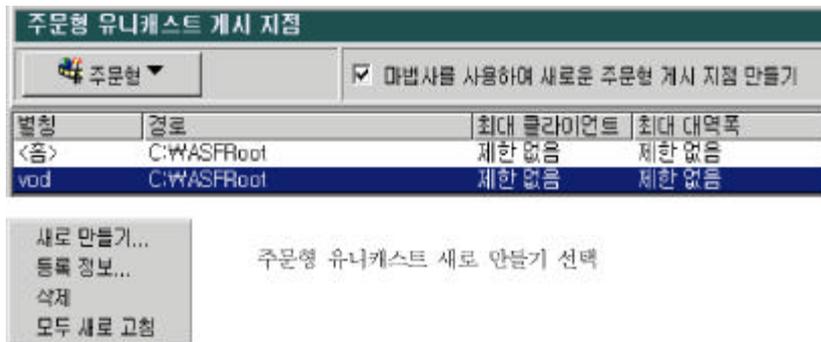


4- 11.

Fig 4- 11. To make New On Demand Publishing Point

3.                                                             <

4- 12>

점을 만들 수 있다.
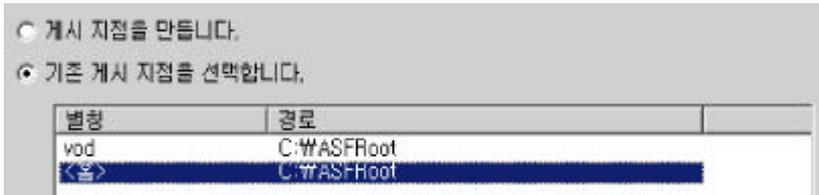


4- 12.

Fig 4- 12. To make On Demand Publishing Point

4. <그림 4- 13>

(Station)                  ,

(Directory)                              .
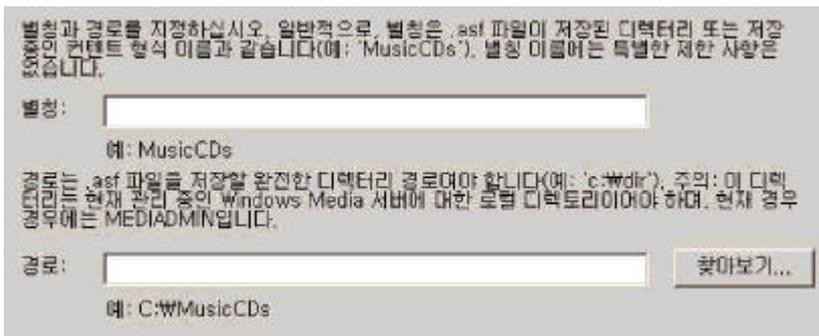


4- 13.

Fig 4- 13. Path Set- up

5.                                              <그림 4- 14>

asf(Advanced Streaming For-

mat)                    asf file

.
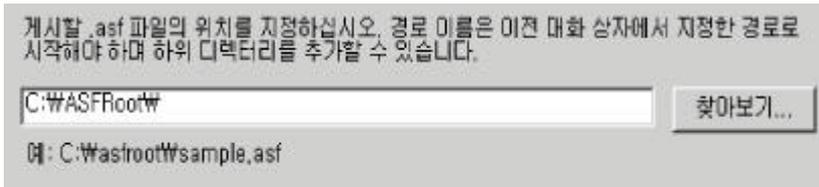
4- 14.

Fig 4- 14. Path Set- up of a file

6.                 <     4- 15>

                              .
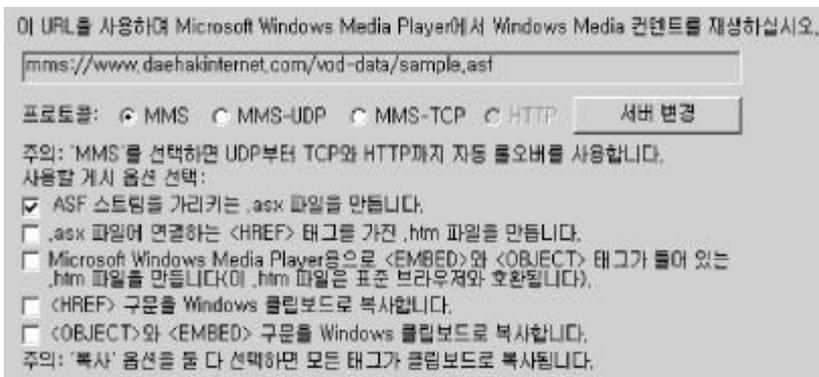


4- 15.

Fig 4- 15. Protocol & Option Set- up

7.                   <     4- 16>                           .

                              .



4- 16.

Fig 4- 16. The result of Set- up

8.                              <        4-17>

.



'vod-data' 게시 지점을 성공적으로 만들었습니다.
'D:\WORK\sample.asx' asx 파일을 성공적으로 만들었습니다.

[추가 정보]로 다음 함고
- Microsoft Windows Media Player나 웹 브라우저에서 .asf, .asx 및 .htm 파일 액세스
- .asx 파일에 기능 추가
- Microsoft Windows Media Player API 프로그래밍 정보 위치
- 게시 지점 편집 및 만들기

URL 테스트    .asx 테스트    <HREF>가 포함된 .htm 테스트    <OBJECT>가 포함된 .h
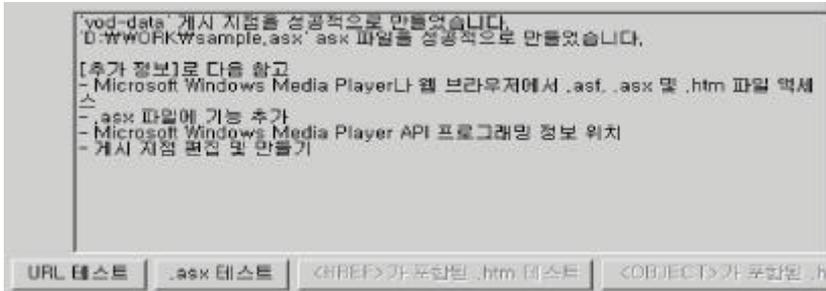


1. URL, ASX 테스트            2. HREF 포함 .htm 테스트            3. OBJECT 포함 .htm 테스트

4-17.

Fig 4-17. Test of Publishing data

9.                              <        4-18>

html                                                            [15],[16].



주문형 유니캐스트 게시 지점

| 주문형 ▼ |  | ☑ 마법사를 사용하여 새로운 주문형 게시 지점 만들기 |

| 별칭 | 경로 | 최대 클라이언트 | 최대 대역폭 |
|------|------|----------------|-------------|
| <홈> | C:\ASFRoot | 제한 없음 | 제한 없음 |
| vod | C:\ASFRoot | 제한 없음 | 제한 없음 |
| vod-data | C:\ASFRoot | 제한 없음 | 제한 없음 |
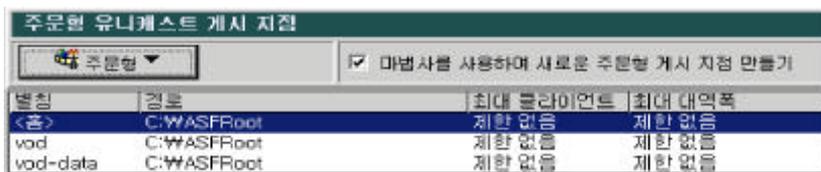
4-18.

Fig 4-18. On Demand Unicast Service

4.2

4.2.1

(LAN : Local Area Network)

(www.daehakinternet.com)

다.

Windows Media Administrator          broadcast
unicast publishing point

VCR

다.

<                  4- 19>

다.

4.2.2

<          4- 19>
<          4- 20>

다.
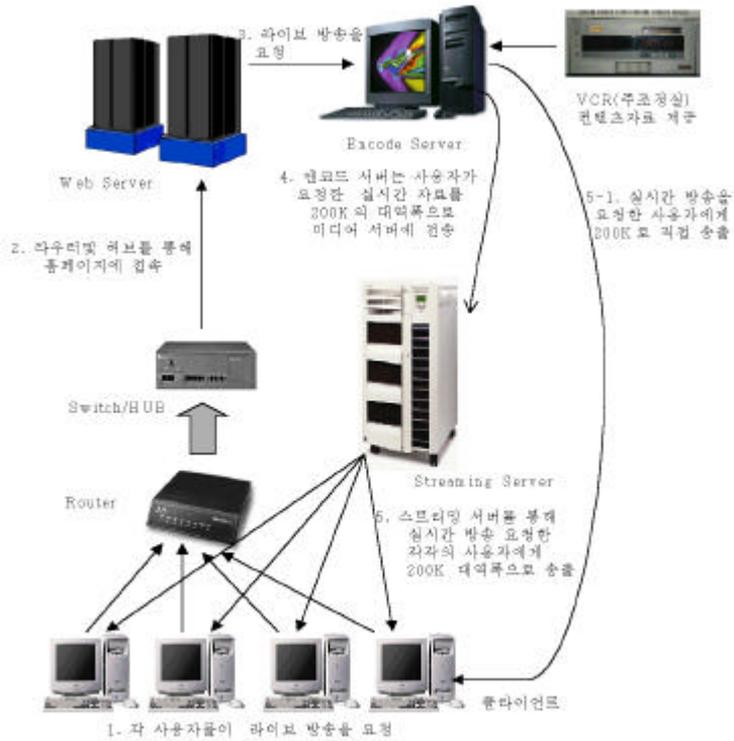
4- 19.

Fig 4- 19. The Connection Path of Realtime Broadcasting



4- 20.

Fig 4- 20. The result of Realtime Broadcasting by request

4.3 　　　　　　　　　　　VOD

4.3.1

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　LAN

(www.daehakinternet.com)　　　　　　　　　　　　　　　　VOD

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　VOD

.

VOD　　　　　　　　　　　　　　　　　　　　　< 　　4- 21>　　　　　.
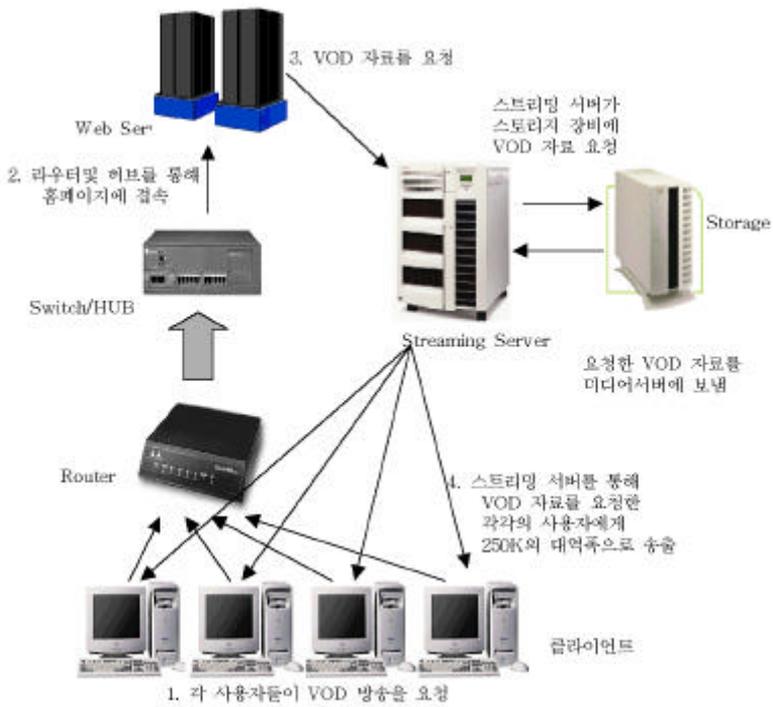


4- 21. VOD
Fig 4- 21. Connection Path of VOD Broadcasting

4.3.2

&lt;

4- 22&gt;                                                    .



4- 22.
Fig 4- 22. License Homepage

&lt;          4- 23&gt;

- (Pop- Up)

,                                        &lt;          4- 24&gt;

.
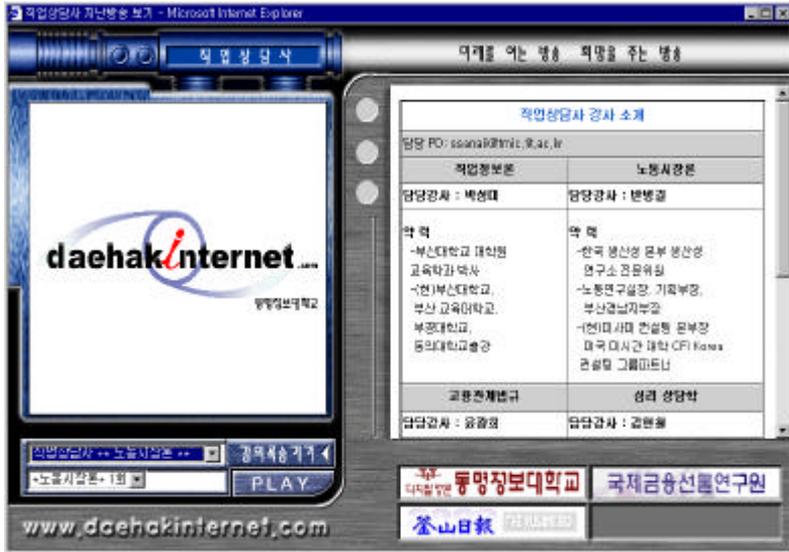
4- 23.

Fig 4- 23. Pop- Up Windows of License
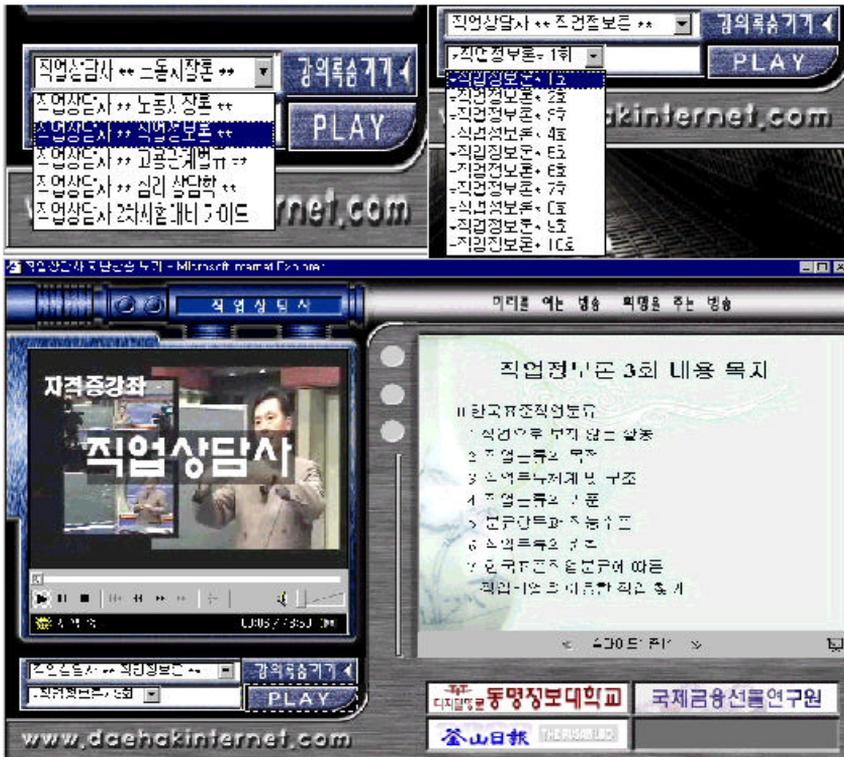


4- 24.

Fig 4- 24. Video On Demand

5

.

VOD                                    .

12

VOD                    .

100%

12        30

.        VOD

,

.

,

.

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．

200kbps　　　　　　　VOD　　　　　　　　　．

．

．

21　　　　　　　　　　　　　　　　　　　　，

（　　　　　　　）

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IMT‐2000(International Mo-
bile Telecommunication 2000)

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