Buffer Control of a Proxy Server for Video Streaming on Internet

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In this thesis, we designed and implemented a proxy cache for a real-time internet video streaming system. The implemented proxy cache is placed between a media server and clients. Upon receiving a request for the stream, the proxy initiates transmission to the client and simultaneously requests the remaining data from the server. We reduced the round-trip delay by the initial data to travel from proxy to client. To hide the delay, throughput, and loss effects of a weaker service model between the server and the proxy, the proxy performs smoothing into the client playback buffer. We were certain that the proxy transmits data to clients with constant rate, while fetching data from the media server. A Video stream is played without discontinuity even when about 4.4% of the packets is lost over the link. The mechanism of data store and transmission are measured for the cache, and the action of the proxy when we apply TCP-friendly transport algorithm for multimedia data.

Keyword: Real-Time Streaming System, Proxy, Buffer

1.

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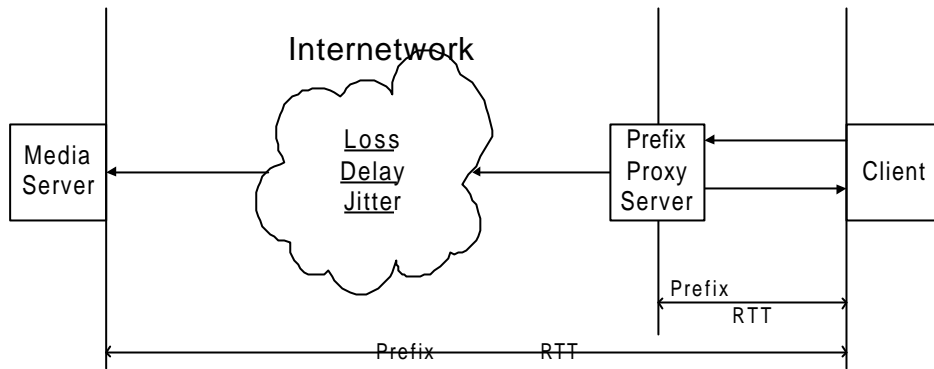, VOD   .

.   ,

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,   ,   .

.   .

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,   .

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,

.   .

,   ,

. RTSP

.

<div align="center">

Internetwork

Loss
Delay
Jitter

Media
Server

Prefix
Proxy
Server

Client

Prefix

RTT

Prefix　　　RTT

1

</div>

．

，

．

，　　　　RTSP　　　RTCP　　　　　　　　　　　　　　　　，　　　．

．

HTML　　　　　　　　，

，

TCP-friendly[2]

[7].　　　　　　　RTT(Round
Trip Time)

．

2.

[1].

RTT　　　　　　　MB　　　GB　　　　　　　　　，

，

．

2-10%　　　　[6].　　　　　　　　　．

30

15 - 30　　　　　．　　　　　．

2. 1

．

．

，

．

(Round - Trip)

[1,3].(　　1　　)

．

t_{sp}

．

$\boldsymbol{l}(t)$

，　　　　　　　　．

$$b_p \geq \int_0^{t_{sp}} \boldsymbol{l}(t)dt \quad\text{................}(1)$$

．

，　　　　　　　．

．

(a)

(b)

图2
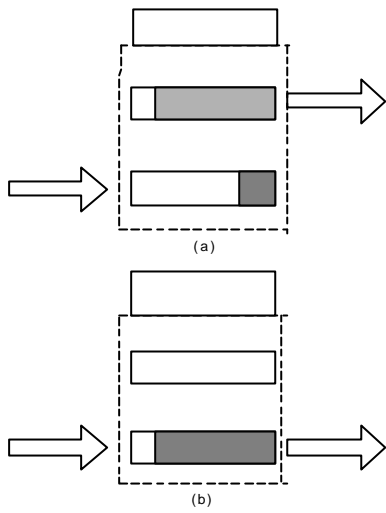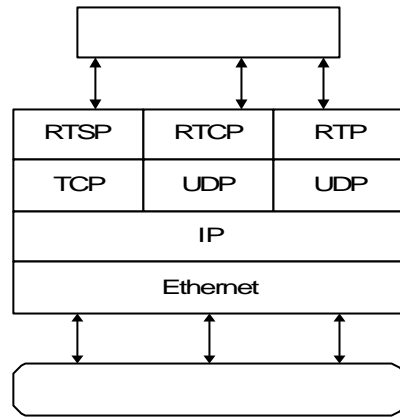
图3

TCP　　　TCP-friendly　　　　　　　．

　　　　　　　　　　　　　　　　　　　．

UDP　　　　　　　　　　　　　　　　　　　　　　　　．

　　　　　　．　　　　　　　　　　　　　RTCP

　　　　　　　　　　　　　　　　　　　　　　　．

　　　　　　[2]．　　　　$l(t)$　　　　　　　　(staging buffer)　　　　．

$0 \leq l(t) \leq B_{sp}$ (B_{sp}

　　　　　)　　　　　　　　　　．　　　　　　　　　　　　　　　　　　　．

　　　　　　　　　　　　　　　　　　　　　　　　　．

　　　　　　　　　　　　　，　　　　2

　　．　　　　　　　　　　90%　　　　　　，

45　　　　1.2MBytes

[8]．

　，　　　　　　　　　　　　　　　　　　　　　　　　．

　　　　　　　　．

　　　　　　　　　3.

　　　　　　　　．

2.2

　　3.1.

　　　　　　　，　　　　　　3　　　　．

　　　　．　，　　RTSP　　VCR

　　　　　　，　[4]　　，RTP

　　　　　　　　　　[5]．RTCP

RTP　　　　　　　　　　　，　　，

RTT

　　　　．　　　[5]．

3.2

RTCP

TCP-friendly

TCP-friendly
[2,13,14]　　　　H.Schulzrinne　　　　　　　　，
RTCP　　　　　　　　　　　　　，

[2].
(Additive Increase Rate,　AIR)

AIR

RTCP

4　　　　．

RTSP

(RTSP)

(PLAY,FF,
PAUSE,
STOP)

(RTCP)

(Bandwidth)

(RTP)

4

3.3

2

RTSP

RTSP

RTCP

5　　　　　　　　　　，
RTCP

RTCP

RTSP

5
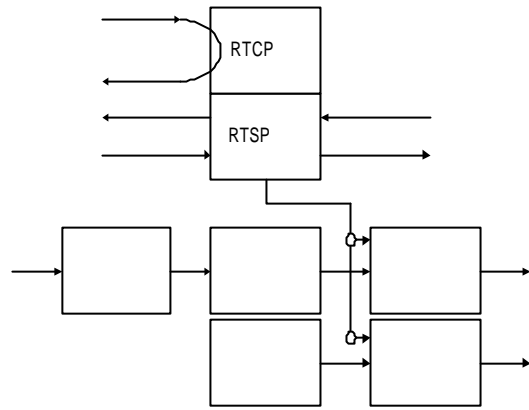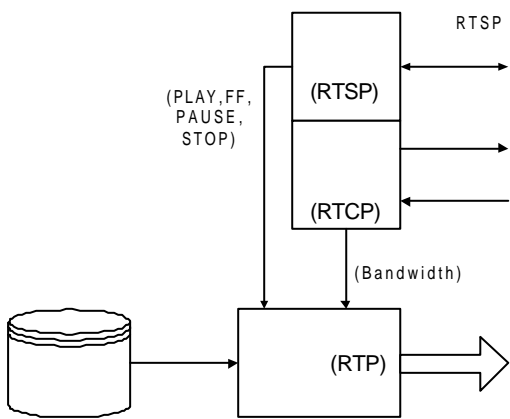
4.

2

MPEG-1
384kbps(48kbytes/sec)　　．

4.1.

6

．　　　　　　　　　　　　　1.4%
，
47319 bytes/sec

40726 bytes/sec　　　．
49152 bytes/sec

4.42%

・

・

・

・

・

6

[15]

・
,

・

4.2

7

・

7

300kbyes

・

・

4.42%
1.4%

4.3

5%

,   RTT

・

5%

8 RTT=4s,   5%

5.

,

・

,

・
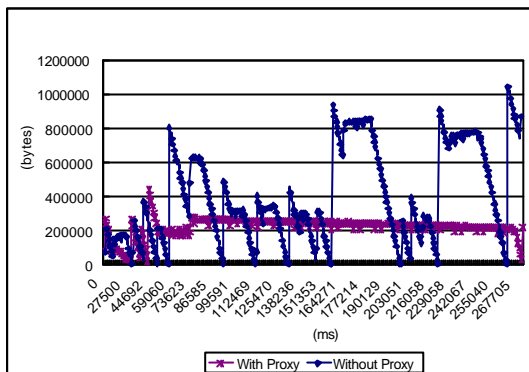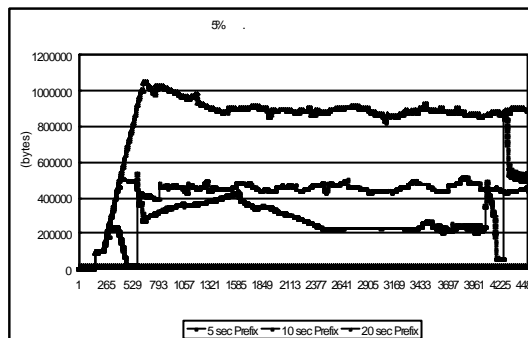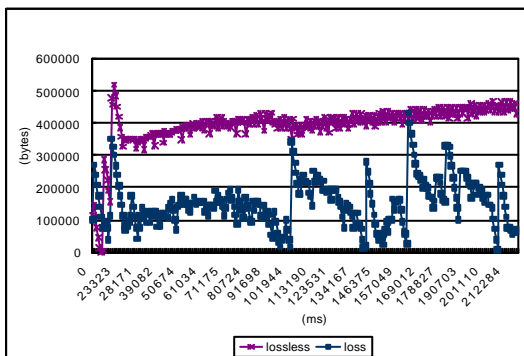
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