VOD(Video On Demand) 서비스를 위한 임베디드 네트워크 엔진

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An Embedded Network-Engine for Video On Demand Service

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Abstract:

Although the embedded network-engine is a demand of time, it is observed that up to this time the network-engines are not sufficient to control the input and output device for Video On Demand (VOD). In this paper we have proposed the wireless network-engine with the capability of controlling the input and output device.

Keyword: VOD, Network-engine, PDA, Socket

1. INTRODUCTION:

Several video transmission techniques, such as enabled network transmission, storage, compression, large amount of digital information, i.e., audio and video *[4, 5]* have been developed for the embedded systems including personal device assistant (PDA). Now users want more facilities for wireless devices with multimedia application and also want to share information with others. In order to support the transmission techniques, in the last decade the researcher achieved their success for the high speed wireless communication and invented the WiBro (Wireless Broadband) and WiMAX (Worldwide Interoperability for Microwave Access).

This work focused on Video On Demand (VOD) transmission over Wi-Fi transmission; this work covers for PDA-to-server Video On Demand (VOD) communication as well as digital camera-to-server video (i. e., VOD) transmission.

During our research, we have considered the memory capacity of PDA, transmission rate, bandwidth, connection procedures and user interaction. We have simulated the total process with some real video clips and obtained some simulated performance results which are shown in the result section.

We have surveyed the related works and found that up to this time few works have been done by some researchers for the network-engine which is particularly for audio, video streaming *[1]*, games *[2]* and voice *[3]*.

2. RELATED WORK:

We have studied some related work and their background. We found that related work in the field of existing network engine are particularly for audio, video streaming [1] and games; few of them has peer-to-peer network facility, few of them has client-to-server and few of them has both facility

2.1. Related work:

2.1.1 GNE-Game networking engine

The GNE is a cross platform game networking engine and main focus is to serve game networking. GNE can handle players unique ID's at the same time also allows the players to send text among the players [2]. GNE maintained a game list from the game server. The players can select the game, from the game list according to his/her choice.

2.1.2 Rakkarsoft-Network engine:

The main goal of rakkarsoft Network-Engine is to transmit data and voice [3]. This network-engine can handle large number of data also support secure remote administration.

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3. IMPLEMENTATION

Our network engine for VOD consists of two components: input (VOD data transfer from input device to the server) and output section (VOD data transfer from the server to output device). Figure-1 represents the detailed structure of the input and output sections.

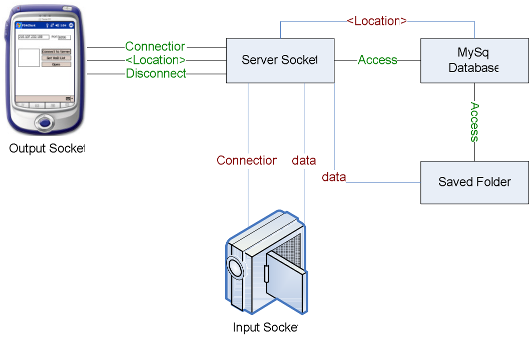


Figure-1: An overview of VOD network- engine

3.1. Intput section:

After capturing the video from the real world, we have sent it to an assigned directory of our VOD server. We have sent the VOD file before the input device exceeds its memory limit. We have copied of the location of that VOD data and sent it to database (which has been saved into our assigned server directory) as meta-data. The internal structure of the input section is shown in Figure-2. An indexing scheme is used to maintaining the proper sequence of received VOD files. This indexing scheme is used for maintain the meta-data.

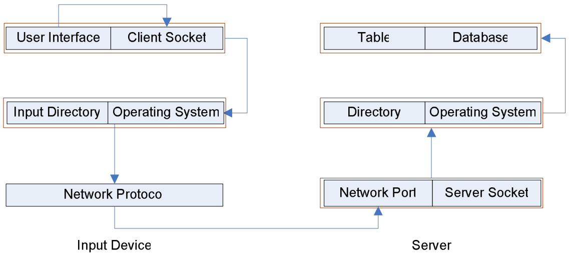


Figure-2: The internal flow of the input section

The indexing scheme is shown in Figure-3. We have maintained two indexing schemes: first indexing is for the data transmit in respect of transmitting time and second indexing is for receive in respect of receiving time.

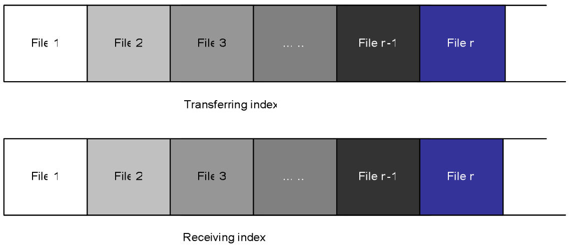
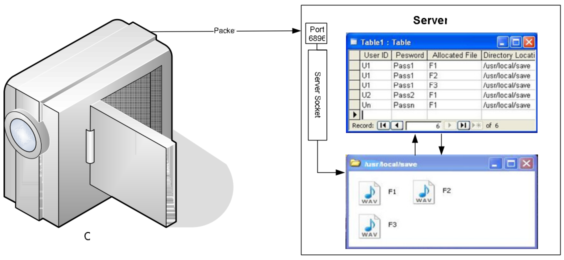


Figure-3: File transfer with indexing

Figure 4 shows the structure for the input section and the associated meta-data operations on the server.



User ID	Pesword	Allocated File	Directory Locati
U1	Pass1	F1	/usr/local/save
U1	Pass1	F2	/usr/local/save
U1	Pass1	F3	/usr/local/save
U2	Pass2	F1	/usr/local/save
Un	Passn	F1	/usr/local/save

Record: 6 of 6

Figure-4: An overall structure of the input section

3.1.1. Algorithm:

Input Section:

(Main folder of input device is denoted by MaFL, files(s) are denoted file File[i], assigned folder of server is denoted by AssFL and database is denoted by db)

```
{
    Request for connection
    Check the MaFL size
    {
        If MaFL >=1024 KB
        {
                Send the File[i] to AssFl
         }
        Else
        {
                Return
        }
}
```

Server part:

```
{

     Send the file[i] location to db.

}
```

3.2. Output section:

In this section we have worked for the data transfer from server to client (e.g., PDA) for downloading. the saved data from the assigned directory via the database server. On receiving the connection request from the client (PDA) the network-engine establishes a connection between server and the PDA. After getting the acknowledgement from the server-side socket the client will send request for the VOD list and the network-engine will get connection with the database server as well as with the meta-data. When the user selects VOD names from the list provided by the server; the corresponding VOD data are retrieved from the assigned directory and then are displayed sequentially at the output device. The internal structure of the output section is shown in Figure-5.

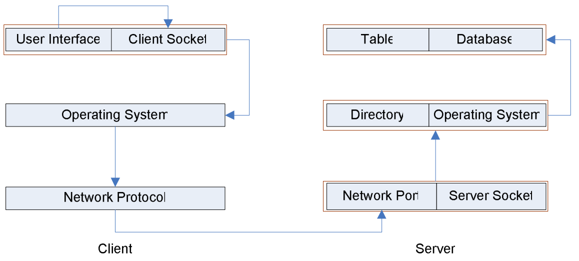
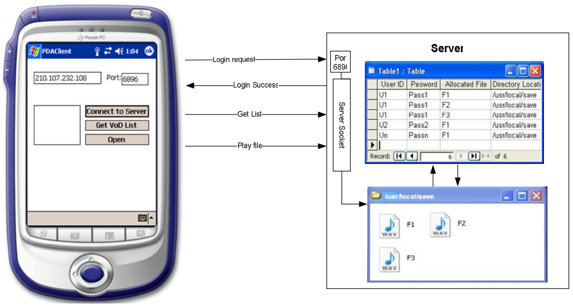


Figure-5: The internal flow off output section

The output system with the user interface is shown in Figure-6:



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U1	Pass1	F3	/usr/local/save
U2	Pass2	F1	/usr/local/save
Un	Passn	F1	/usr/local/save

Record: 6 of 6

Figure-6: An overall structure of output section.

3.2.1. Algorithm:

Output Section:

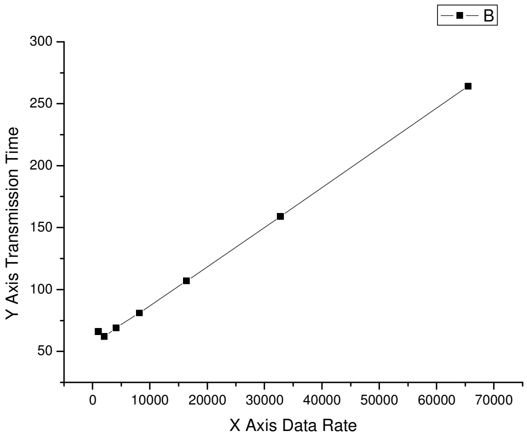
(Files(s) are denoted file File[i], assigned folder of server is denoted by AssFl and database is denoted by db)

```
{
    Request for connection
    Connect to the db for file(s), File[i]
    {
        Connect to the AssFl
    }
    Run the File[i]
    Close the connection
}
```

4. RESULTS:

We have evaluated the data transferring rate between server to PDA and we obtained the performance table and graph shown in Graph-1 and Table1. During the performance test we tested several packet sizes sent from server to PDA and also analyzed the packet lose rate. The whole process was done by the wireless internet connection.

Table-1 and Graph-1 represent the transmission time calculated as a function of packet size.



Graph-1: Server-to-PDA data transmission time

5. CONCLUSION:

An embedded network-engine for Video On Demand service is presented in this paper. We can easily say that our network-engine is good for the wireless communication and especially for the VOD service. As a future work we are going to combine our network engine with the real application running on digital cameras and also to develop some techniques for the data recovery during the large-scale of VOD transmission.

Reference:

[1] Chih-Shoung Huang, et al "Design of video service engine with SCSI for an ADSL-based near Video On Demand system" IEEE Transactions on Consumer Electronics, Vol. 43, No. 3, pp.386-393, August 1997

[2] GNE-Game Networking engine, http://www.gillius.org/gne/

[3] Rakkarsoft, http://www.rakkarsoft.com/

[4] Vladimir Nedovic, Chris Nelson, Scott Bowser, and Oge Marques, "Delivery of near real-time soccer match highlights to wireless PDA devices", Proceedings of the IASTED International Conference on Visualization, Imaging, and Image Processing September 8-10, Benalmádena, Spain, 2003

[5] Ahmet Ekin and A. Murat Tekalp, “A generic model and sports video processing for summarization and model-based search,” in Handbook of Video Databases (ed. Borko Furht and Oge Marques), CRC Press, 2003.

Table: Server-PDA data transmission

Packet size (byte)	Number (Packet)	Received	Lost	Minimum (ms)	Maximum (ms)	Average (ms)
512	50	50	0%	11	109	60
1024	50	50	0%	7	209	66
2048	50	50	0%	11	112	62
4096	50	50	0%	19	117	69
8192	50	50	0%	34	130	81
16384	50	50	0%	59	157	107
32768	50	50	0%	109	209	159
65500	50	50	0%	212	329	264

Table-1: Server to PDA data passing rate.