Analysis of IPTV Channels Watching Preferences in Bosnia and Herzegovina

A. Tanovic  
Department for IT Development of Multimedia Services  
BH Telecom d.d. Sarajevo  
Bosnia and Herzegovina  
anel.tanovic@bhtelecom.ba

I. Androulidakis  
Jožef Stefan International Postgraduate School  
Jamova 39, Ljubljana SI-1000, Slovenia  
sandro@noc.uoi.gr

F. Orucevic  
Department of Computer Science and Informatics  
University of Sarajevo  
Bosnia and Herzegovina  
forucevic@etf.unsa.ba

Abstract – IPTV service is a new service which is today offered from almost every Telecom operator. One of the advantages of IPTV service stemming from its architecture is certainly the fact that it is very easy to measure what TV channels are the ones mostly watched. This paper describes this measurement and analysis results in one Telecom operator in Bosnia and Herzegovina. They describe what TV channels are mostly watched in different time periods. We developed a simple weighting algorithm to order the channels by watching rate. Based on it we are providing extensive tables. This paper forms an industrial contribution with results important for marketing but also is scientific contribution because it introduces one new method of scoring TV channels based on previous measurements in their audience. We also developed IPTV Statistics model and described results from this research for a new statistics model. This paper is the continuous of previously published contributions from this area.

Keywords – IPTV; TV channel; telecom operator; channel rating; statistics model.

I. INTRODUCTION

IPTV service is a new IP service which is introduced in almost every Telecom operator [2-4]. IPTV system has several subsystems like: Middleware system, Video on Demand system, Encryption system, Database system, Monitoring system, Statistics system and Headend system [3-4]. Middleware system and the Statistics system are the important elements for the process of measurement of watched TV channels. The relationship between these 2 systems is shown in Figure 1.

Fig. 1. The relationship between 2 IPTV subsystems

Previous research of authors from this field is based on description of changing Middleware system based on ITIL V3 recommendations [3] and the analysis of implementation of Information Security Management in IPTV system of Telecom operator [4]. This research continues with researches in this Telecom operator and the aim of all investigations is to improve business processes which are connected to IPTV. This contribution built upon [10] to further explore rating of IPTV channels user’s preference [11].

Section II describes the methodology of the measurement which is done in Telecom operator in Bosnia and Herzegovina and section III has a detailed description of the results in graphs. Section IV presents the conclusion of work in which is introduced one new method of scoring TV channels based on
previous done measurements and new developed IPTV Statistics model.

II. METHODOLOGY OF THE RESEARCH

Statistics system is responsible for communication with every Set Top Box [6, 7]. This system has internal scripts and a MySQL database which is responsible for storing all data [5]. Internal scripts communicate with every Set Top Box and if user watches one TV channel more than 60 seconds, these scripts write the relevant new record in the MySQL database. The value of 60 seconds is an approximate value stemming from previous research in the area, trying to answer the question of how many continuous seconds must elapse before we can say that the user is actually watching the given TV channel [8, 9]. The main table in this database is table STAT which contains fields that are described in Table I.

| The name of field | The meaning of field | Type of the variable |
|-------------------|----------------------|----------------------|
| EVENT_ID          | This field signs what type of IPTV content is used for statistics – 1 is for TV, 2 is for VoD, 3 is for Radio | INTEGER |
| CHANNEL_TAG       | The name of TV channel | VARCHAR2 |
| SUBSCRIBER_ID     | Unique number for each subscriber | INTEGER |
| DEVICE_ID         | Unique number for each Set Top Box | INTEGER |
| CONTENT_ID        | Unique number for each TV content | INTEGER |
| TIMESTAMP         | The time when TV content starts | DATETIME |
| DURATION          | The duration of TV content | INTEGER |
| RATING            | The rating of TV content | INTEGER |
| INSERT_DATE       | Date and time when the record is inserted into MySQL database | DATETIME |

All measurements are done with a few SQL queries which link all these fields:

```
  "select channel_tag, sum(duration)/3600 from stats
  where s.event_id='1'
  and s.timestamp between '2011-05-01 00:00:00' and '2011-06-01 00:00:00'
  group by s.content_id"
```

The measurements have been done on 30,000 of users and they included 16840649 records during May 2011. This month has been taken into account because the number of IPTV users in Telecom operator [4] was the biggest in this month. The number of TV channels is 75.

The research has been done in 11 categories (each category corresponding to different time periods) and for each category we included the first 20 TV channels. For the rating algorithm, 20 points are given for the 1st channel in order in each test category, 19 points are given for the 2nd channel in order, 18 points are given for the 3rd channel in order, 17 points are given for the 4th channel in order etc. and for the last 20th channel just 1 point. The summary results are given in table II.

| The name of TV channel | The number of points for each TV channel |
|------------------------|----------------------------------------|
| FTV                    | 219                                     |
| NTV HAYAT              | 200                                     |
| OBN                    | 197                                     |
| BHT                    | 189                                     |
| NOVA TV                | 178                                     |
| PINK BIH               | 171                                     |
| MINIMAX                | 141                                     |
| OTV VALENTINO          | 139                                     |
| HRT 1                  | 123                                     |
| FOX LIFE               | 122                                     |
| TV 1                   | 111                                     |
| TVSA                   | 97                                      |
| FOX CRIME              | 73                                      |
| RTV SLOAN              | 69                                      |
| NTV JASMIN             | 65                                      |
| DISNEY XD              | 58                                      |
| ARENA SPORT 3          | 46                                      |
| HRT 2                  | 37                                      |
| DISC. TRAVEL & LIVING  | 26                                      |
| RTV TK                 | 13                                      |
| DISCOVERY              | 11                                      |
| RTL+                   | 6                                       |
| ARENA SPORT 2          | 5                                       |
| TV 1000                | 4                                       |
| HISTORY CHANNEL        | 4                                       |
| NATIONAL GEOGRAPHY     | 2                                       |
| EUROSPORT              | 2                                       |
| ARENA SPORT 4          | 1                                       |

III. RESULTS

Figure 2 presents the most watched TV channels during May 2011. Figure 3 shows the most watched TV channels in the 1st week of May 2011 from 1st May to 8th May. Figure 4 presents the most watched TV channels in the 2nd week of May 2011 from 8th May to 15th May. Figure 5 shows the most watched TV channels in the 3rd week of May 2011 from 15th May to 22nd May. Figure 6 shows the most watched TV channels in the 4th week of May 2011 from 22nd May to 31st May.

Figure 7 presents the most watched TV channels for working days through May 2011. As such, it includes every day except weekend days with total number of 24 days. Figure 8 shows the most watched TV channels for weekend days through May 2011 with the total number of 7 days.

Figure 9 describes the most watched TV channels for morning hours which includes hours from 6 a.m. to 12 a.m. Figure 10 presents the most watched TV channels for afternoon hours which includes hours from 12 a.m. to 8 p.m. Figure 11 describes the most watched TV channels for evening hours which includes hours from 8 p.m. to 11 p.m. Figure 12 presents the most watched TV channels for night hours which includes hours from 12 p.m. to 6 a.m.
The column ‘the number of points for each TV channel’ in table II is the summary of points for each TV channel in all measurements. In all measurements, we gave 20 points for the 1st TV channel, 19 points for the 2nd TV channel, 18 points for the 3rd TV channel and etc., and finally 2 points for the 19th TV channel and 1 point for the 20th TV channel. The total number of TV channels that have at least 1 point is 28. So even 47 TV channels, of the total number of TV channels which are 75, are not presented in this table. Table II shows that first 5 TV channels are local channels, and in first 10 channels is just 1 foreign TV channel.

Fig. 2. The most watched TV channels in month (May 2011.)

Fig. 3. The most watched TV channels in the 1st week of month (May 2011.)
Fig. 4. The most watched TV channels in the 2\textsuperscript{nd} week of month (May 2011.)

Fig. 5. The most watched TV channels in the 3\textsuperscript{rd} week of month (May 2011.)
Fig. 6. The most watched TV channels in the 4th week of month (May 2011.)

Fig. 7. The most watched TV channels in working days of month (May 2011.)
Fig. 8. The most watched TV channels in weekend days of month (May 2011.)

Fig. 9. The most watched TV channels in morning hours of month (May 2011.)
Afternoon hours Report

![Afternoon hours Report](image1)

Fig. 10. The most watched TV channels in afternoon hours of month (May 2011.)

Evening hours Report

![Evening hours Report](image2)

Fig. 11. The most watched TV channels in evening hours of month (May 2011.)
Fig. 12. The most watched TV channels in night hours of month (May 2011.)

Fig. 13. Final results after all 11 tests

| The name of category | Results for each category |
|----------------------|---------------------------|
| 1<sup>st</sup>        | 42.5%                     |
| 2<sup>nd</sup>        | 30.1%                     |
| 3<sup>rd</sup>        | 25.7%                     |
| 4<sup>th</sup>        | 1.5%                      |
| 5<sup>th</sup>        | 0%                        |
IV. CONCLUSION AND FUTURE WORK

Comparison of results from Figure 13 and other figures is giving these concluding remarks for Telecom operator from Bosnia and Herzegovina:

1. Final results are totally the same as the results from Figure 2 which considers the most watched TV channels in a month for the first 20 channels except that in the final result TV channel HRT 1 is not on 10th place but on 9th place.

2. Last seven TV channels on final Figure 13 are obtained from Figure 11 which represents the most watched TV channels in the evening hours. It means that for each analysis of the most watched TV channels, evening hours (from 8 p.m. to 11 p.m.) should be placed in the special category.

3. The analysis has shown that 28 TV channels are presented in the final table. The total number of TV channels are 75, so 47 TV channels are almost not watched.

4. 8 of 10 first TV channels are local TV channels and only Minimax, which is on the 7th place, and Fox Life, which is on the 10th place, are foreign TV channels. Simply conclusion is that local TV channels are more watched than foreign TV channels.

5. There are major differences in ratings between the first 6 TV channels and only minor differences in ratings between channels under the 6th place.

6. First 12 TV channels are only important for the most users (the number of points is 100 and more). This is specific result for this Telecom operator.

This analysis can be used to predict user preferences about watching TV channels in Bosnia and Herzegovina. From previous research we can conclude what TV channels are very low level of watching. For Telecom operator with 100

| Channel | TV Channels Watching Preferences in Bosnia and Herzegovina | 20th Place, in the 4th category are TV channels from 21st place to 50th place and in the 5th category are TV channels from 51st place to 100th place.

The aim is to compare results from the same Telecom operator in different months or from different Telecom operators in the same month. Future research in this area is based on these comparisons.

Table III shows results for IPTV statistics model which are produced in this research. This result shows that all 3 channel categories in this research are almost equally watched.

REFERENCES

[1] A. Tanovic, I. Androulidakis, “Improving the eTOM standard for Telecom operators”, XXIII International Symposium on Information, Communication and Automation Technologies, ICAT 2011, Sarajevo, Bosnia and Herzegovina, 2011.

[2] A. Tanovic, F. Orucevic, “Implementation of the Information System of the Telecom Operator Using the ITIL V3 Methodology for the Service Design Phase”, 2nd International Conferences on Advanced Service Computing, SERVICE COMPUTATION 2010, pp. 82 - 91, Lisbon, Portugal, 2010.

[3] A. Tanovic, F. Orucevic, “Changing the Middleware System for IPTV Services Telecom Operators Based on the Methodology of the Change Management Process”, 3rd International Conferences on Advances in Multimedia, MMEDIA 2011, pp. 104 - 110, Budapeste, Hungary, 2011.

[4] A. Tanovic, F. Orucevic, “Analysis of the implementation of the Information Security Management in the IPTVVoIP system of the Telecom Operator”, 18th International Conference on Systems, Signals and Image Processing, IWSSIP 2011, pp. 1-5, Sarajevo, Bosnia and Herzegovina, 2011.

[5] J. Huang, A.B. Lee, D. Munford, “Statistics of range images”, IEEE Conference on Computer Vision and Pattern Recognition, Vol. 1, pp. 324-331, 2000.

[6] P. Gaas, J. T. Tromp, P. M. B. Vitanj, “Algorithmic statistics”, IEEE Transactions on Information Theory, Vol. 47, No. 6, pp. 2443-2463, 2001.

[7] Y. J. Won, Mi-Jung Choi, Byung-Chul Park, J. W. Hong, Hee-Won Lee, Chan-Kyu Hwang, Jae-Hyoun Yoo, “End-User IPTV Traffic Measurement of Residential Broadband Access Networks”, IEEE Network Operations and Management Symposium Workshops, NOMS 2008, pp. 95-100, 2008.

[8] T. Zijian, R. C. Cannizzaro, G. Leus, P. Banelli, “Pilot-Assisted Time-Varying Channel Estimation for OFDM Systems”, IEEE Transactions on Signal Processing, Vol. 55, No. 5, pp. 2226-2238, 2007.

[9] M. K. Tsatsinis, G.B. Giannakis, “Blind identification of time-varying channels using second-order statistics”, 29th Asilomar Conference on Signals, Systems and Computers, pp. 162-166, 1995.

[10] M. J. Montpetit, H. Calhoun, H. Holtzman, D. Grossman, “Adding the Community to Channel Surfing: A New Approach to IPTV Channel Change,” 6th IEEE Consumer Communications and Networking Conference, CCNC 2009, pp. 1 – 5, Las Vegas, Nevada, USA, 2009.

[11] H. Lin Wang, J. Gang Wang, W. Yun Yau, “Automated age regression for personalized IPTV services”, IEEE International Conference on Multimedia and Expo (ICME 2010), pp. 1333-1336, Singapore, 2010.