

The M2M traffic antipersistent feature was obtained in the [10] by simulation. We will investigate the similar model on the test bed.

The Skype traffic self-similar feature was obtained in the [15]. The Skype traffic is self-similar with $H = 0.6$ for inter-arrival time and $H = 0.7$ for packet lengths.

III. TEST BEDS STRUCTURES

The test bed structures are depicted on the Figure 2 and Figure 3 for the BitTorrent and Skype traffic investigation and M2M traffic investigation respectively.

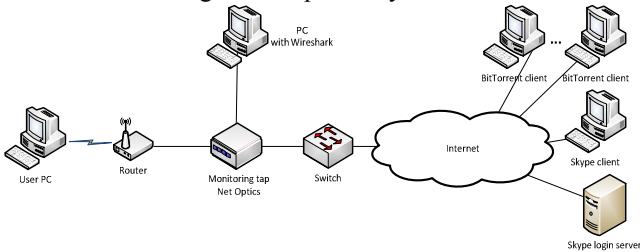


Figure 2. The test bed to investigation of the BitTorrent and Skype traffic

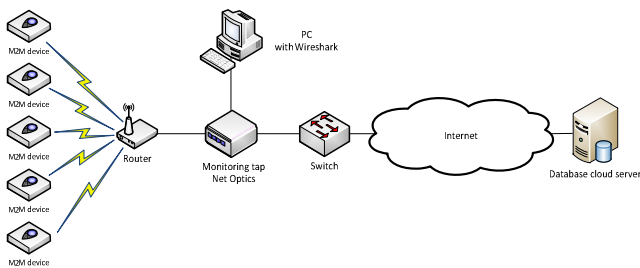


Figure 3. The test bed to investigation of the M2M traffic

We assume that the home network is located in the modern apartments PS, smartphone, tablet, WiFi router and sensor nodes from M2M system “smart home” that are acceptable. The simultaneously conversation on Skype, files downloads by BitTorrent and data transmission from sensor nodes can lead to overload of home network. Thus, the M2M traffic, BitTorrent traffic and Skype traffic should be studied well.

The both types of traffic outgoing and incoming are obtained on the test bed. The network coupler from NetOptics vendor is used for traffic flows interception. The NetOptics support the technology Zero Delay that can warranty the uninterrupted system operation even during power failures. The traffic parameters are fixed by Wireshark. It can have a possibility to obtain traffic parameters in real time.

IV. SKYPE TRAFFIC

We have obtained the voice Skype traffic. The mean traffic value for voice conversation is likely 500 Kbit/s. We use the analysis of change in dispersion method for Hurst parameter calculation.

The base formula for this method is:

$$\sigma^2[Y^m] \propto m^{-k},$$

where Y – original sequence, m – block size, $k=2-2H$.

The H parameter calculates the next method. The dependence $\sigma^2[Y^m]$ from m are built on the logarithmic scale.

Further, the straight line is defined by least square method and the Hurst parameter is calculated by the slope of the line.

The Hurst parameter estimations by the analysis of change in dispersion method for outgoing and incoming voice Skype traffic are shown on the Figure 4 and Figure 5 respectively.

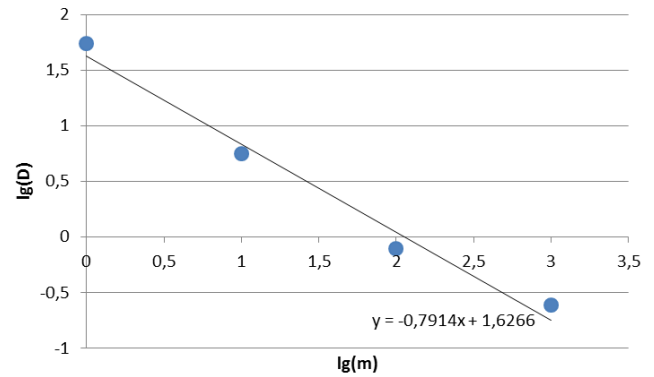


Figure 4. The Hurst parameter estimation by the analysis of change in dispersion method for outgoing voice Skype traffic

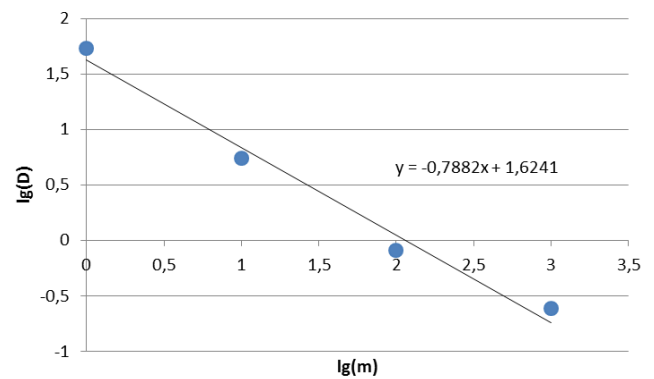


Figure 5. The Hurst parameter estimation by the analysis of change in dispersion method for incoming voice traffic

The Hurst parameters value for outgoing and incoming the voice Skype traffic about the same and equal $H=0.6$. This estimation is almost the same as the one from [15]. Thus, the voice Skype outgoing and incoming traffic in the home network is the self-similar with small rate of self-similarity.

V. BITTORRENT TRAFFIC

The file with size 1 Gbait was downloaded. The method of the analysis of change in dispersion for Hurst parameter calculation was used.

The Hurst parameter estimations by the analysis of change in dispersion method for outgoing and incoming BitTorrent traffic are shown on the Figure 6 and Figure 7 respectively.

The Hurst parameter estimation for outgoing BitTorrent traffic is $H=0.36$. The Hurst parameter estimation for incoming BitTorrent traffic is $H=0.38$. Both estimations reveal the anti-persistent BitTorrent traffic nature for the home networks. This can be possible in accordance with transmission mass of short packets to home network from mass computer that is located all over the world. The transmission mass of short packets from the computer of the

home network to mass computer that is located all over the world is the reason for $H=0.36$ for outgoing BitTorrent traffic.

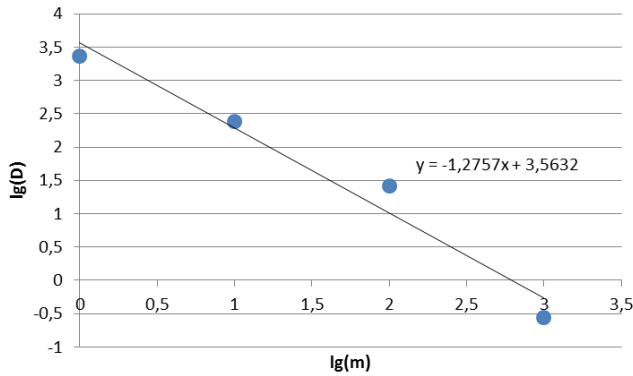


Figure 6. The Hurst parameter estimation by the analysis of change in dispersion method for outgoing BitTorrent traffic

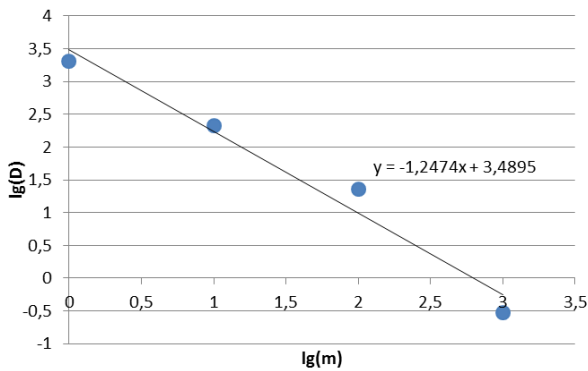


Figure 7. The Hurst parameter estimation by the analysis of change in dispersion method for incoming BitTorrent traffic

VI. M2M TRAFFIC

The method of the analysis of change in dispersion for Hurst parameter calculation was used for estimation M2M traffic. The anti-persistent nature of M2M traffic was obtained in the [10] in case of mass event detection.

The Hurst parameter estimations by the analysis of change in dispersion method for outgoing and incoming M2M traffic are shown on the Figure 8 and Figure 9 respectively.

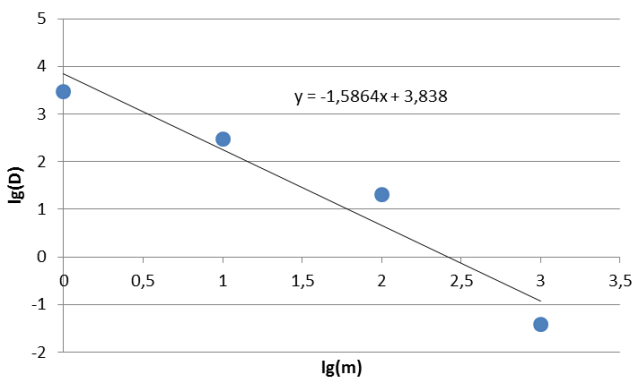


Figure 8. The Hurst parameter estimation by the analysis of change in dispersion method for outgoing M2M traffic

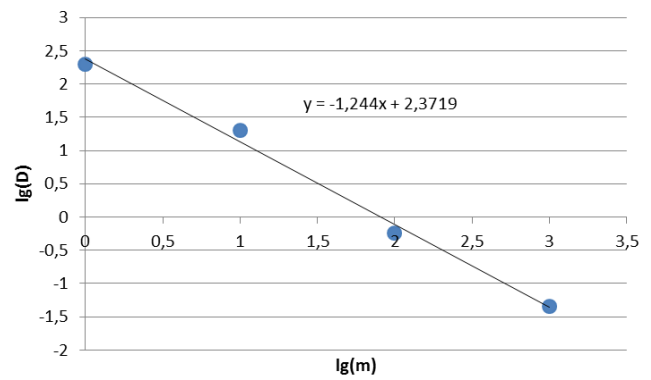


Figure 9. The Hurst parameter estimation by the analysis of change in dispersion method for incoming M2M traffic.

The Hurst parameter estimation for outgoing M2M traffic is $H=0.21$. The Hurst parameter estimation for incoming M2M traffic is $H=0.38$. Both estimations reveal the anti-persistent M2M traffic nature for the home networks. The outgoing M2M traffic is a traffic with big value of anti-persistent.

VII. CONCLUSIONS

In this paper we investigated the BitTorrent, Skype and M2M traffic on the home wireless network with PC, smartphone, tablet, WiFi router and sensor nodes. The test beds were used for investigation. The obtained results has shown that outgoing and incoming BitTorrent and M2M traffic have the anti-persistent features on the home network. The anti-persistent features of the BitTorrent and M2M traffic can deeply affect the quality of services and the quality of experience. The methods for anti-persistent traffic control on the home networks should be developed.

FUTURE WORK

In the future we will investigate M2M traffic effect to the IPTV quality of experience. Furthermore, the anti-persistent traffic scheduling methods for the home networks will be developed.

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