

# An Efficient Tree-based Self-Organizing Protocol for Internet of Things

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**Abstract:** This paper presents methods that can perform real-time estimation of the available bandwidth of a network path. In networks, such as the Internet, knowledge of bandwidth characteristics is of great significance in, e.g., network monitoring, admission control, and audio/video streaming.

The term bandwidth describes the amount of information a network can deliver per unit of time. For network end users, it is only feasible to obtain bandwidth properties of a path by actively probing the network with probe packets, and to perform estimation based on received measurements. In this thesis, two rate adjustment algorithms, and a modified excursion detection algorithm (EDA) for estimating the available bandwidth (ABW) of an end-to-end network path more accurately and less intrusively. Based on the concept of "self-induced congestion,". It features a unique probing train structure in which there is a region where packets are sampled more frequently than in other regions. This high-density region enables our algorithm to find the turning point more accurately.

Spread factor is used to adjust the range between the lower rate and upper rate, due to which the number of packets are kept low so we can measure the ABW less intrusively. Thus, finally to detect the ABW from the one-way queuing delay, we present a modified EDA from Path Chirp. Path Chirp features an exponential flight pattern of probes we call a chirp. Packet chips offer several significant advantages over current probing schemes based on packet pairs or packet trains. Overall, this thesis shows that in many cases it is achievable to obtain efficient and reliable real-time estimation of available bandwidth.

**Keywords:** Available bandwidth, probe rate model, queuing delay, rate adjustment, modified excursion detection algorithm, Path Chirp.

## 1. Introduction

**1.Available bandwidth:** The Internet provides a best-effort service model applications that transfer data over the Internet are provided no guarantees or even apriority acknowledge about the end-to-end performance that their transfers should expect. Such knowledge, if available, can help applications in better aligning their configuration and data transmission with the current state of network resources. Consequently, many applications rely on mechanisms or protocols that investigation network paths to estimate the level of end-to-end transfer performance that a given network path can provide.

**2.Cross-traffic:** We define a cross-traffic burst to be the traffic that intervenes between two consecutive packets of a significant flow. At each hop the individual burst between a specific packet pair may differ. However, we seek to understand the probabilities of various amounts of traffic intervening between a pair of packets in a significant flow at a congested router. Thus, we are only interested in characterizing the probability distribution of intervening burst sizes.

## 2. Motivation

Ideally, a probing scheme should provide an accurate measurement of ABW while requiring less time and imposing as light a load as possible. The amount of probe traffic is proportional to the rate of sampling and the number of concurrent measurement sessions. As a result, the effect of probe packets on cross traffic exacerbates with traffic increase.

Therefore, researchers have developed several end-to-end ABW estimation techniques that infer the network characteristics by transmitting a few packets and observing the effects of intermediate routers or links on these probing packets

### 3. Goal

Our goal is to estimate the ABW with good accuracy and less intrusively, i.e., without interrupting other network traffic to the extent possible.

### 4. Objectives

1. To detect these sudden increases in queuing delays and to filter out them are the main purpose of the excursion detection algorithm
2. To detect the ABW from the one-way queuing delay curve. The top of this paragraph illustrates a sub-subheading.

### 5. Literature Survey

[1] **WBest: a Bandwidth Estimation Tool for Multimedia Streaming Application over IEEE 802.11 Wireless Networks**, 2008 Mingzhe Li, Mark Claypool and Robert Kinicki

This paper presents a new Wireless Bandwidth estimation tool (WBest) designed for fast, non-intrusive, accurate estimation of available bandwidth in IEEE 802.11 networks.

[2] **Regression-Based Available Bandwidth Measurements**, 2013 Bob Melander, Mats Björkman, Per Gunningberg

This paper presents a method for estimating the available bandwidth of a network path. It is an extension and enhancement of the bandwidth measurement method TOPP.

[3] **Experimental Comparison of Bandwidth Estimation Tools for Wireless Mesh Networks**, 2010 Dhruv Gupa Daniel W Prasant Mohapatra Chen-Nee Chuah time.

In this paper, we present fundamental insights and solution characterizations that include: 1) showing that the complexity of the problem remains high for any continuous and increasing rate function; 2) formulating and proving sufficient and necessary optimality conditions of two baseline scheduling strategies that correspond to emptying the queues using one-at-a-time or all-at-once strategies;

[4] **New Available Bandwidth Measurement Technique for Service Overlay Networks**, 2014 Cao Le Thanh Man, Go Hasegawa and Masayuki Murata

Measuring the available bandwidth information is critical for providing QoS assurance, especially for the bandwidth-limited 802.11-based wireless networks. Our approach incurs very low cost to the network without any explicit message overhead.

### 6. Problem Statement

The major problem with the existing system is the traffic to the network path added by the AWB tools. This may adversely affect application traffic and measurement accuracy. The Quantity of probe circulation is relative to the rate of sampling and the figure of simultaneous quantity sessions. Due to this the effects of cross traffic worsens.

Therefore researchers have developed several end-to-end ABW estimation techniques that infer the network characteristics. By transmitting a few packets and observing the effects of intermediate routers or links on these probing packets.

### 7. Existing System

Ideally, a probing scheme should provide an accurate measurement of ABW while requiring less time and imposing as light a load as possible. ABW estimation tools add traffic to the network path under measurement. This may adversely affect application traffic and measurement accuracy. The amount of probe traffic is proportional to the rate of sampling and the number of concurrent measurement sessions. Thus, the effect of probe packets on cross traffic exacerbates with traffic increase. Thus less intrusive approach is desirable.

### Existing System Algorithm

Modified Excursion Detection Algorithm

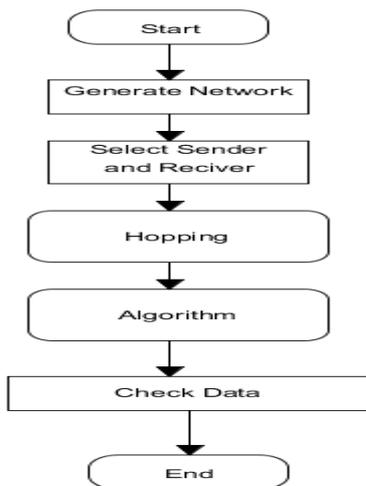
Require: qd: Queuing Delay; F: Decrease Factor;  
Set  $I = 0$  (current location in chirp);  
Set  $j = 0$  (current location where queuing delay increases);  
Set  $N$  = Total number of packets in a chirp.  
Ensure: TP: Turning point of the queuing delay signature.

```
while qd[j] ≥ qd [j + 1] and j < N do
    increment j by 1;
end while
Set i = j + 1
while i ≤ N do
    Set qdsum = 0 and count = 1;
    for k = 0 to j do
        qdsum = qdsum + qd[k];
        increment count by 1;
    end for
    if count > 1 then
        avgQdelay = qdsum / (count - 1);
    end if
    if qd[j] > avgQdelay then
```

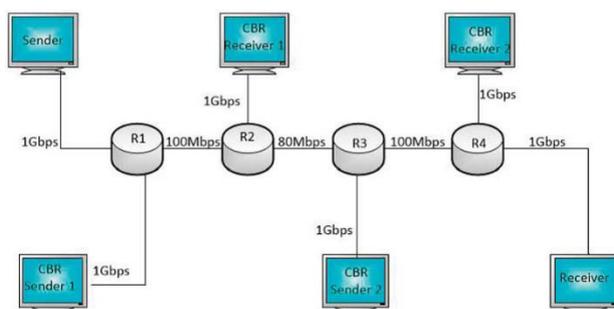
```

        maxQdelay = max (maxQdelay,
            qd[i] - qd[ j])
        if (qd[i] - qd[j]) < (maxQdelay/F)
        then
            j=i;
            while qd[j] ≥ qd [j + 1] and j <
            N do
                : increment j by 1;
            end while
            Set i = j;
        end if
    else
        : increment j by 1;
    end if
    increment i by 1;
end while
if j = N then
    decrement j by 1
end if
Set TP = j;
    
```

### Flow Chart of Algorithm



### Existing System Architecture



### 8. Proposed System

By considering the various challenges Mentioned above, our goal is to estimate the ABW with good accuracy and less intrusively, i.e., without interrupting other network traffic to the extent possible. The main contributions of this paper are as follows: To detect the ABW from the one-way queuing delay curve, we have proposed a modified excursion detection algorithm. Due to the burst arrival of CT, a sudden increase in queuing delays of packets (called excursion) occur for a short period in the router even though the packet's rate is much below the ABW of the tight link. So, to detect these sudden increases in queuing delays and to filter out them are the main purpose of the excursion detection algorithm.

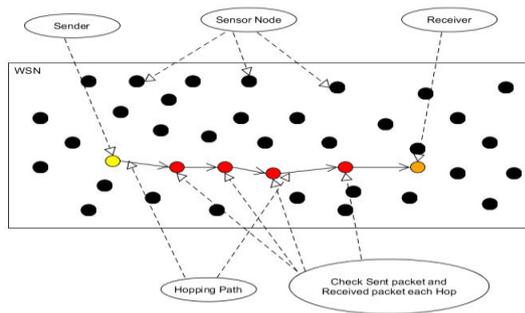
### Proposed System Algorithm:

B= hop  
 C= Nodestatus ND=Nodedistance  
 DN= Destination node

```

Set i=0 current location
For B=0 to multihop
{
    For ND=0 to DN
    {
        If(1=0 ;i<ND; i++)
        {
            If(c="0")
            { packet missing }
        }
    }For B=0 to multihop
    {
        For ND=0 to DN
        {
            If(1=0 i>ND i++)
            {
                If(c="1")
                { packet received }
            } }For (n=1 to nd)
            {
                If(n!=ND)
                {
                    If(d1>d)
                    {
                        If(d1=d)
                        {
                            N=nodename
                        }
                    }
                }
            }
        }
    }
    }
    
```

### Proposed System Architecture



## 9. Conclusions

In this article, we have presented an improved technique to compute the available bandwidth between two neighboring nodes and, by extension, along a path. The estimation leads to more accurate results than previous solutions by estimating the collision probability that packets will experience.

## 10. Result Table

Parameter	Existing System	Proposed System
Timing	1.35s	1.17s
Memory	159270.4075kb	121113.3125kb
Efficiently	Less	More
ILP	60%-70%	80%-85%

## 11. Expected Result

We are going to implement our system estimating the available bandwidth (ABW) of an end-to-end network path more accurately and less intrusively.

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## References

[1]C. D. Guerrero and M. A. Labrador, "On the applicability of available bandwidth estimation techniques

and tools," *Computer Communications*, vol. 33, no. 1, pp. 11–22, 2010.

[2]P. Papageorge, J. McCann, and M. Hicks, "Passive aggressive measurement with mgrp," *SIGCOMM Comput. Commun. Rev.*, vol. 39,no. 4, pp. 279–290, Aug. 2009.

[3]M. Li, C. Mark, and K. Robert, "Wbest: A bandwidth estimation tool for IEEE 802.11 wireless networks," in *33rd IEEE Conference on Local Computer Networks*, 2008. LCN 2008., Oct 2008, pp. 374–381.

[4]P. Zhao, X. Yang, C. Dong, S. Yang, S. Bhattarai, and W. Yu, "On an efficient estimation of available bandwidth for ieee 802.11-based wireless networks," in *Global Telecommunications Conference*

[5]C. D. Guerrero and M. A. Labrador, "On the applicability of available bandwidth estimation techniques and tools," *Comput. Commun.*, vol. 33, no. 1, pp. 11–22, 2010.

[6]X. Liu, K. Ravindran, and D. Loguinov, "Multi-hop probing asymptotics in available bandwidth estimation: Stochastic analysis," in *Proc.5th ACM SIGCOMM Internet Meas. Conf. (IMC)*, 2005, pp. 173–186.

[7]B. Melander, M. Björkman, and P. Gunningberg, "Regression- based available bandwidth measurements," in *Proc. Int. Symp. Perform. Eval. Comput. Telecommun. Syst.*, San Diego, CA, USA, 2002, pp. 1–25.

[8]A. K. Paul, A. Tachibana, and T. Hasegawa, "NEXT: New enhanced available bandwidth measurement technique, algorithm and evaluation," in *Proc. IEEE PIMRC*, Washington, DC, USA, 2014, pp. 443–447.