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Evaluation of QoS inWiMax

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Abstract

In this paper, we examine WiMAX - primarily based network and evaluate the performance for quality of service (QoS) using a good idea of IEEE 802.16 technology. In our models, the research used a multiprocessor Architecture organized by the interconnection network. OPNET Transformer is employed to simulate the Architecture and calculate the performance conditions (throughput, delay and data dropped) that slightly worried in network estimation. That is figured our models shorten enough time quite a little bit for getting the performance steps of an end-to-end delay as well as throughput can be used as a powerful tool for this purpose.

Keywords: *QoS, WiMAX, IEEE802.16, Performance Analysis.*

1. Introduction

Parallel computers with multiprocessor systems are opening the door to teraflops processing performance to fulfill the increasing demand of computational electrical power and can execute the applications faster when compared to a continuous system [1]. Essentially parallel computing with multiprocessor systems represents a strong technology backbone that boosts computational productivity by merging a range of standard building nodes and delivering performance across the multi-core system. WiMAX is a wi-fi broadband-broadcasting technology based on wireless metropolitan area marketing (WMAN) standard manufactured by IEEE 802.16 researchers. This provides high data rates, last mile wireless gain access to, point to multipoint communication, large frequency range and guarantees QoS for various applications [2]. The topology of network categorized WiMAX into two main sets, IEEE 802.16d-2004 (known as Fixed WiMAX) and IEEE802.16e-2005. That promises to deliver the internet throughout the world connecting the last mile of communication services [3]. Designing a paralleled-network models are hard to completely exploit hardware capacities and achieve the extraordinary energy efficiency target required for science and engineering Applications [2, 3]. The study utilized WiMAX which permits the delivery of last mile wireless high speed access as an option to wired internet connection like cable and digital subscriber line (DSL). It is main advantage is to serve fixed, nomadic and lightweight wireless broadband connection without the need for direct line-of-sight communication way with a base stop. Sufficient bandwidth that concurrently supports hundreds of businesses with T-1 speed online connectivity and 1000s of residences with DSL speed connectivity. These types of features prospect WiMAX as a suitable technology for the potential applications as connecting Wi-Fi hotspots to parts of the internet and providing data and telecommunications services [2, 4].

2. Literature Work

Different system architectures and essays have recently been proposed to meet the demand for higher performance multiprocessor considering cost and power. Article [4] introduced protocols for broadcasting interconnection network and uses simulation to look at the performance of the protocols over the SOME-Bus multiprocessor architecture. It's efficiently applied analytical approach reaching high bandwidth, low latency and large fan-out generally there is a significant analysis in literature that shows artificial intelligence techniques could be used to forecast the performance measures of any multiprocessor architecture [5]. In that study, a broadcast-based multiprocessor architecture called the SOME-

Bus employing the DSM programming model was considered. The statistical ruse of the architecture was completed to generate the dataset. Support vector regression was used to generate conjecture models for estimating average network response time (i. e. the time period between the instant when a cache miss triggers a message to be enquired in the final result channel until the instant when the corresponding data or acknowledge message comes at the input queue), average channel waiting time (i. e. the time interval between the instant when a packet is enquired in the result channel before the instant when the packet moves under service) and average processor utilization (i. electronic. average fraction of your energy that threads are executing). That was concluded that support vector regression model is a good tool for predicting the performance steps of a DSM multiprocessor. Our basic idea is to accumulate a tiny quantity of performance measures by by using a statistical simulation and calculate the performance of the system for a huge group of input parameters centered on these.

3. Architectures WiMax

Automobile access internet wirelessly through a mobile handheld device or from a notebook computer, today, there are two common types of wireless communication gain access to. In a wireless Local Area Network, wireless users transmit/receive bouts to/from an access point that in turn is connected to the key central source. In wide-area wireless gain access to networks, packets transmitted to basics station over the same infrastructure used for cellular telephony Nowadays, WiMAX represents any technology speeding communication and dethrone existing standards. WiMAX [Intel WiMAX 2009, WiMAX Online community 2009], often known as IEEE802. fourth there's 16, is a long-distance relative of the IEEE802.eleven. WiMAX operates independently of cellular network and guarantees speeds of tera Mbps or higher over miles of ten kilometer Mobile interoperatibility (WiMAX) used for microwave access and can extend the power and range of Wi-Fi and cellular networks. Very often, WiMAX could become the only wireless technology, because Wi fi and cellular never have permeated surfaces that can be reached via WiMAX [4]. Figure1 discusses the general protocol architecture for the IEEE 802.sixteen standard. Just like be seen, a common multimedia access control (MAC) is provided to work on top of various physical tiers (PHY). The interface between the several PHYs and the MAC is accommodated as a separate sub-layer, the transmission convergence sub-layer. A convergence sub-layer (CS) is provided on top of the MAC, to support both IP as well as ATM-based network solutions [2].

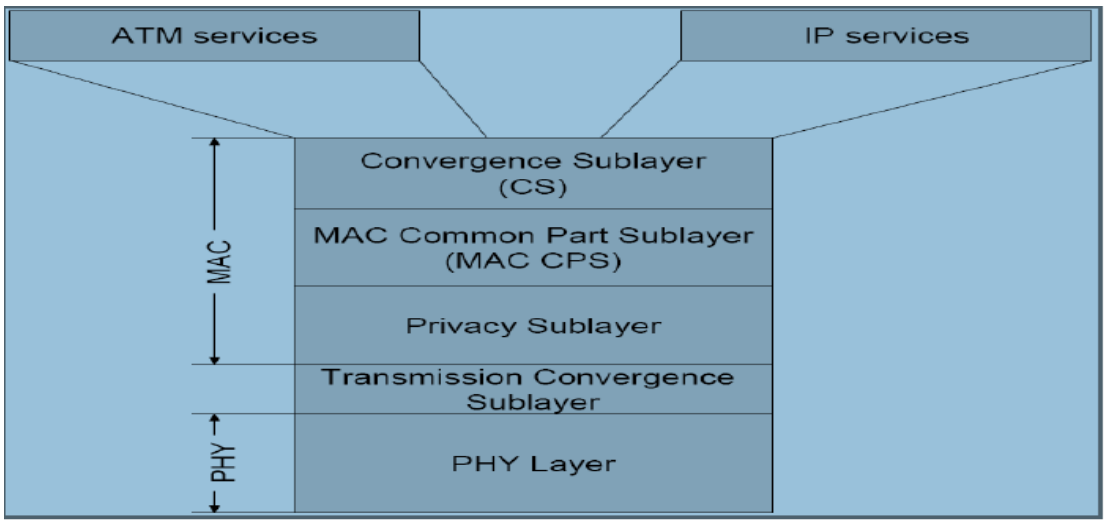

Figure 1: WiMAX Technology Architecture

The next three metrics (throughput, delay and data dropped) are being used for evaluating the reliability of the QoS models:

a) Network throughput is the average data rate of successful message delivery on the communication channel. This kind of data may be provided on the physical or reasonable link, or pass through a certain network client. It is usually sized in bits per second (bit/s or bps) and often in data packets every second or data bouts per time slot. This kind of kind of m parameter is essential inside the prospect through the device owner and it also actions the amount of consumer demands that are tackled with the machine. That is a method to determining the quantity of service that is provided. The response quantity of affirmed system increases because the system throughput increases. When the maximum throughput within the techniques accomplished, the response time becomes unlimited because the internal queuing delays become arbitrary large.

b) Delay: plays an important design and performance characteristic of any computer network or telecommunications network. The delay of the network identifies how long it will take for a Computer Applications: A great International Journal (CAIJ), Volume. 2, No. 2, May possibly 2015_ 18 bit of data travel across the network from a single node or endpoint to a different. It is typically measured in in terminables or fractions of just a few seconds. Delay may differ a little bit, depending on the location of the specific set of communicating nodes. Generally there is a certain minimal standard of delay that will be experienced because of the time it takes to send a packet serially by using a link, this is added a more variable level of postpone due to network traffic jam IP. Network delays can vary from simply a few ms to several hundred ms [6]

c) Data decreased, measures the average of data packets that lowered due to their distribution through network model levels (i. e. overflow of buffers) and due to their fails to reach to their receiver organizations (failure of all retransmissions until retry limit). This calculated as the total size of higher coating data packets (in bits/sec) dropped by the complete network [7].

4. Simulation

In this article, OPNET Module [8] is employed to reproduce the communication network structures employing the WiMAX process. Figures 2, 3, 4 and 5 show the nodal model of the four different scenarios, correspondingly:

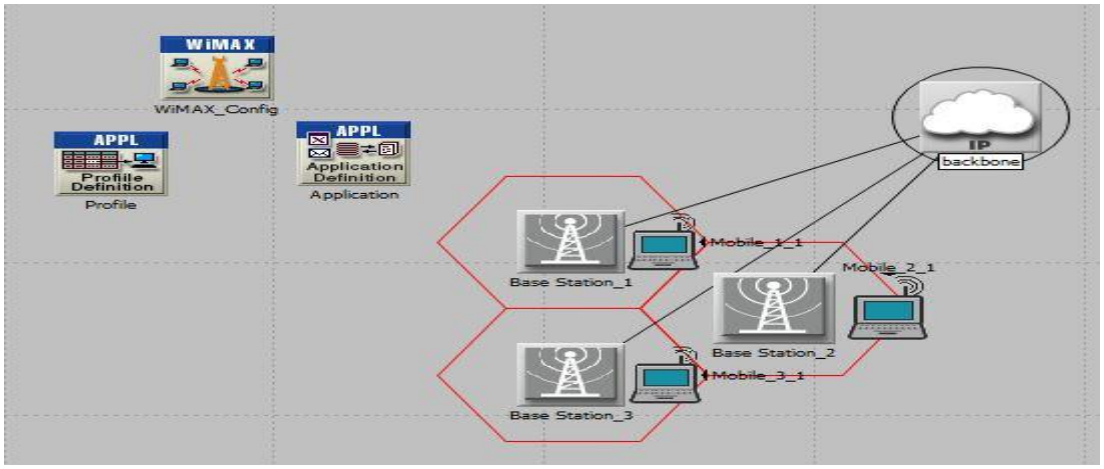

Figure 2: Scenario 1, three base stations with single Mobile

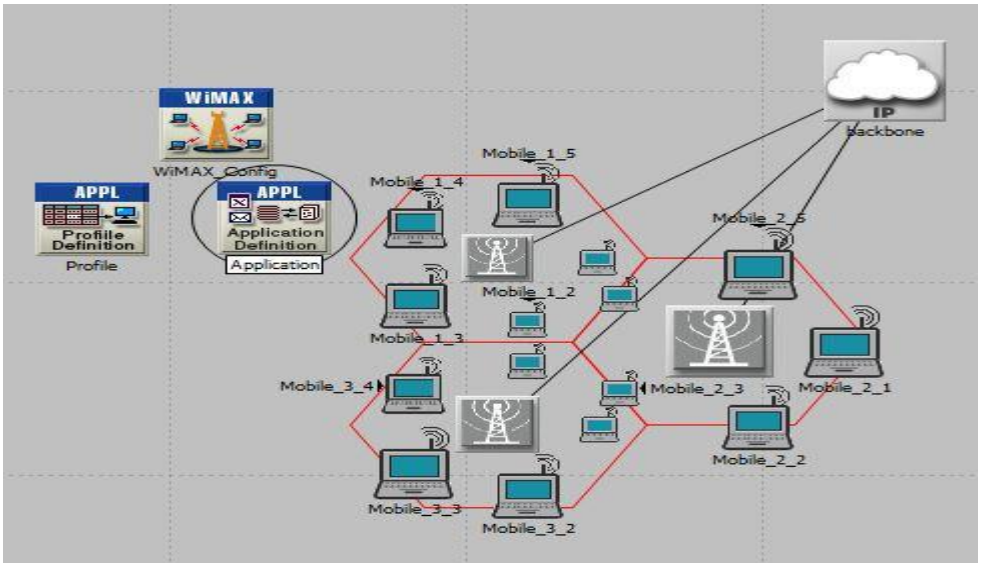

Figure 3: scenario 2, three base stations with a three Mobile

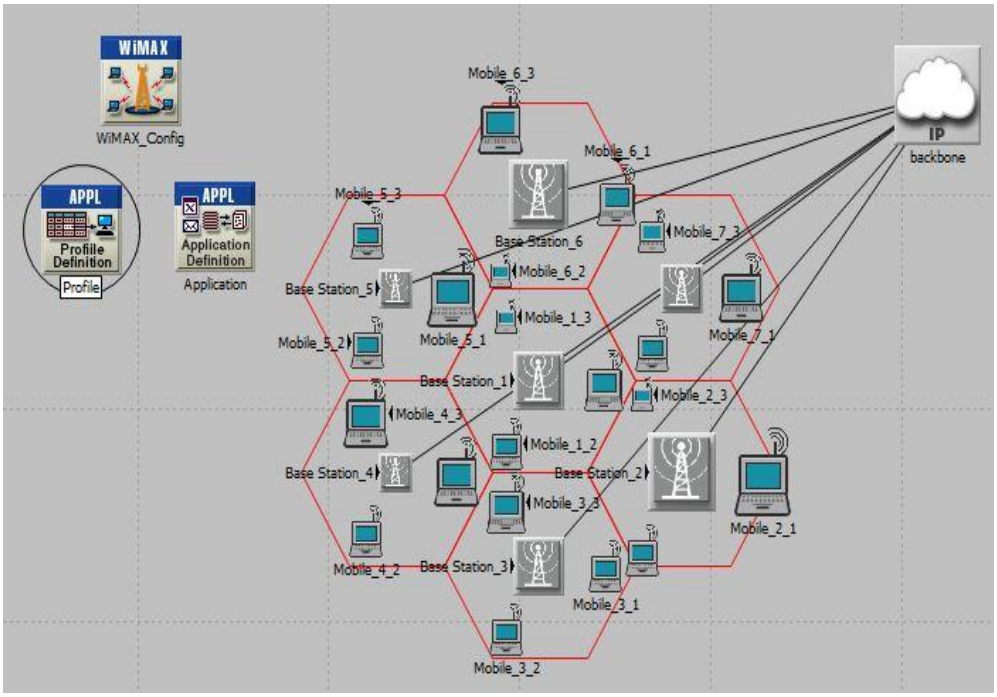

Figure 4: scenario-3, seven cells with three mobile

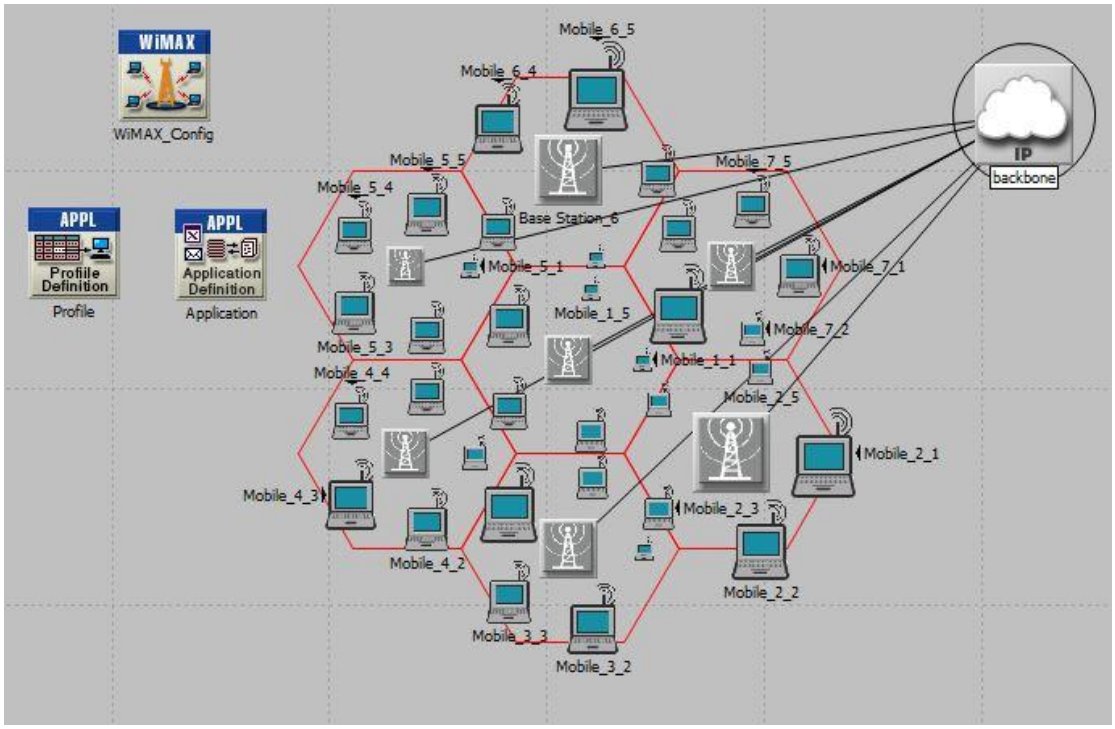

Figure 5: Scenario-4, seven cells with five mobile

In most Scenarios, each node consists of a processor station when the incoming messages are store and processed. Furthermore, a channel station in which the outgoing messages are stored before transferring them onto the network. The important parameters of the simulation are the amount of data transfer efficiently performed, the number of the threads executed by each processor (dropped or lost) and the mean output variables are: average throughput, average network response.

5. Results and Discussion

Simulation has been run for 30 mints and traffic pattern fixed using several quantities to measure and compute the simulation guidelines of the QoS. The main parameters include the Desk 1: The compared precision for QoS using our schemes.

Table 1: The compared accuracy for QoS using our schemes

No. of Node	Delay	Throughput	Data Dropped
Scenario-1 (3 mobile stations)	No delay	Good throughput	No data dropped
Scenario-2 (15 mobile stations)	Slight delay	Better than scenario 1	Increase in data dropped
Sceanrio-3 (21 mobile stations)	Slight delay	Better than scenario 1,2	Increase in data dropped and worse than scenario 1,2
Scenario-4 (35 mobile stations)	High delay	Much better than all scenarios	Increase in data dropped worse than all scenario

Inside the overall models model-4 is a suitable model in applications that require high network traffic performance measure From the effect shown in Table-1 the next notes can be suggested. In model-1 study utilize three base stations each with asingle mobile. The outcome registered high throughput with zero wait. The bandwidth reservation a bit limits the bandwidth. In model-2 the analysis uses 3 cells each contains 3 mobiles. Because of free band width, there is an ever-increasing in throughput value with minor delay. The problem with this scenario that there is no way to increased data dropped rate In both model-3 and model-4 the numbers of cells increased to eight and the numbers of mobile per cell remains frequent in model-3 and increased to five in the later. The band width is established free in both models. In model-3 and model-4, the throughput parameter is acceptable and high, respectively. The hold off in model -3 is slightly considered and in contrast in model-4. The enlargement of data dropped rate observed in model-4 because increasing the number of base stations satisfy the traffic needs As an end result we mentioned that the throughput is rapidly increased compared to the model in Figure 2. Also, for the info dropped it's a little bit increased with no significant change observed for hold off. In Figure 4 increasing cells number from 3 to seven boosts up the throughput factor and limits the data decreased, whilst for the postpone remains unchanged. In Determine 5 setting the mobile stations by five mobile in each cell we observed that the Quality of service analysis parameters: the throughput is quietly increased and both the delay and the information dropped are reduced in contrast to the other situations.

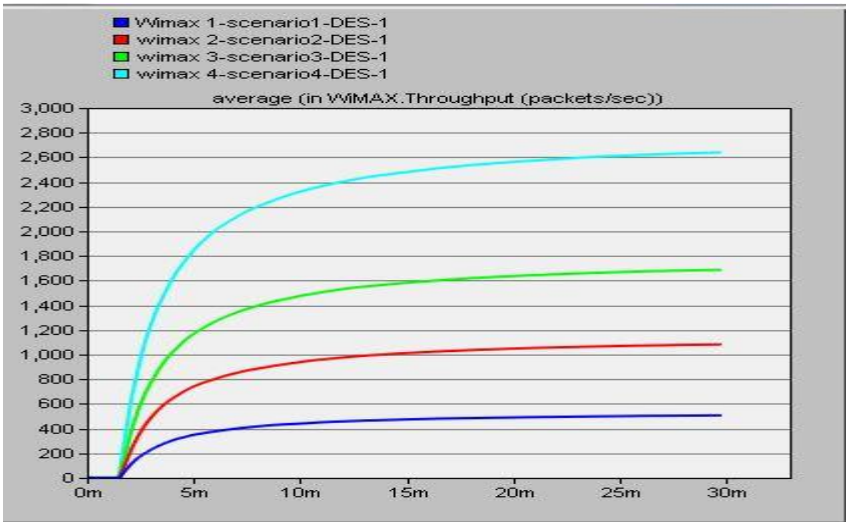

Figure 6: Average throughput computation for the four scenarios over WiMAX

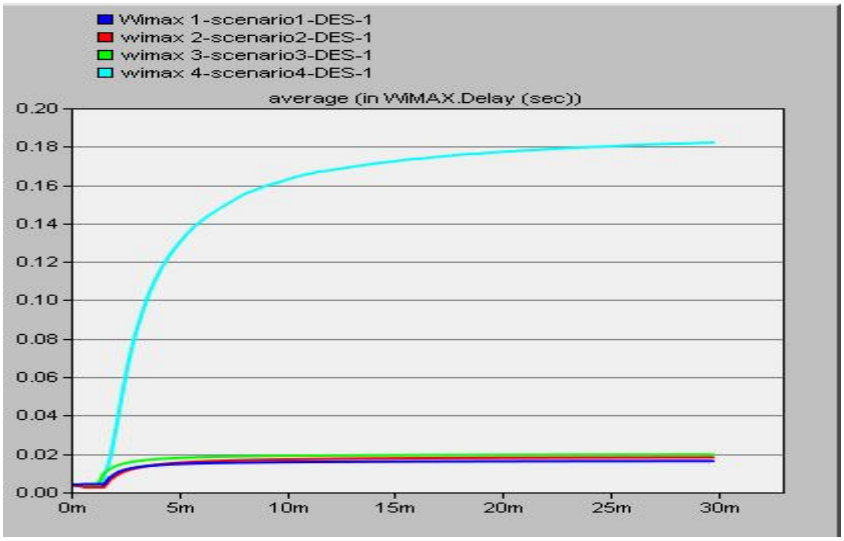

Figure 7: Average Delay computation for the four scenarios over WiMAX

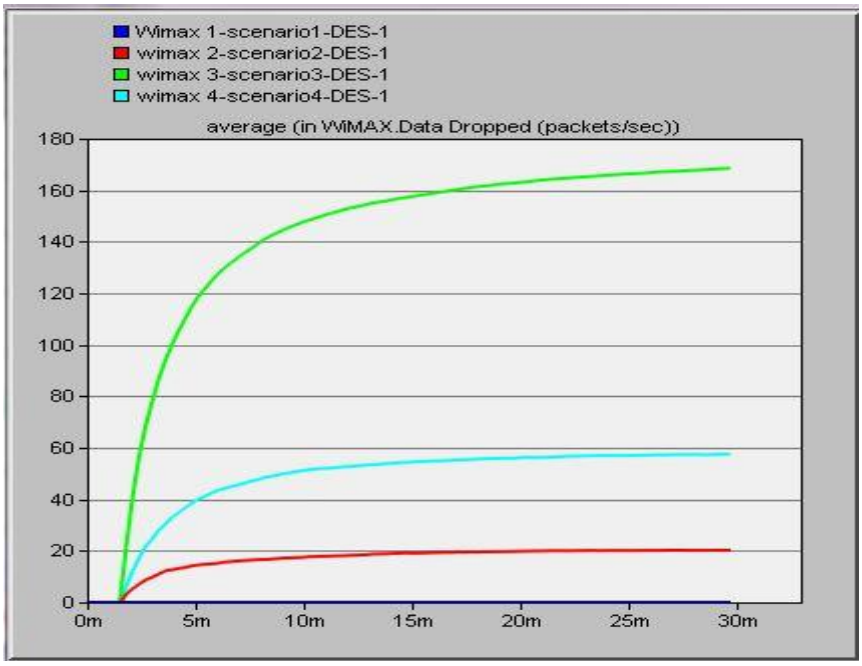

Figure 8: Average Data dropped computation for the four scenarios over WiMAX

6. Conclusion

This article provides an overview and performance analysis of QoS in WiMAX network. The analysis examined in this paper WiMAX with multiprocessor architecture connected with each other by the interconnection network. OPNET Modeler can be used to simulate the architecture and calculate the performance standards (i. e. throughput, hold off and data dropped) that slightly concerned in network estimation. The comparison between schemes in conditions of performance metrics is provided in Table-1. It truly is deducted that our models reduce the time quite a lttle bit for obtaining the performance measures of your end-to-end wait as well as throughput can provide as a powerful tool for this specific purpose.

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