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Tri Feature Streaming Approximation Based Random Placement and Location Selection for Macro Cells Units for Improved Data Rate in 5G-SDN Networks

S. Sasikala[1] S.L.Swarna[2] S D.kokila[3]

1. S.Sasikala,Assistant professor, Department of Computer Science and Engineering, Excel Engineering college, Salem, Tamilnadu, India
2. S.L.Swarna,AssistantProf, Department of Computer Science and Engineering, Excel Engineering college, Salem, Tamilnadu, India
3. D.Kokila,Assistant professor,Department of Computer Science and Engineering, Excel Engineering college, Salem, Tamilnadu, India

Abstract

The growing need of higher data rate streaming challenges the network service providers. The 5G network has been emerged to improve the streaming performance and set of algorithms available for the development of bandwidth utilization and streaming performance. The earlier methods suffer to achieve higher performance in terms of streaming and bandwidth utilization. To improve the performance, an Tri Feature Streaming Approximation technique is presented in this paper. The Tri feature streaming approximation technique is aimed to maintain the streaming performance with the features of cell units, bandwidth utilization, and congestion. Any sink node has been analyzed for the routes available, streaming performance, bandwidth utilization, presence of micro/macro/small units, MMO units and so on. Based on the above mentioned features, three factors have been analyzed as route support, cell support, and bandwidth support. Based on these values, tri feature streaming performance has been approximated. Approximated result has been used to find the suitability of routes to maintain the streaming performance and performs random placement of cells required. The proposed method improves the performance of streaming and bandwidth utilization.

Keywords 5G, SDN, MIMO, Macro Cell, Small Cell, Bandwidth Utilization, Streaming Rate, TSA Model.

1 Introduction

The modern human societies utilize the network services through their mobile devices, PDA and other devices. They perform their most activity through the internet and they access various video/audio services through the devices. Such applications requires higher data rate to maintain the streaming for the betterment of the application. The existing networks are struggle to provide such seamless transmission and suffer to maintain the data rate. To support the efficient streaming and data rate maintenance, 5G networks has been emerged.

The software defined network (SDN) supports the feasibility and flexibility in choosing service according to the infrastructures. The interface or controller present in the SDN would perform scheduling, selection of route and other controls according to the requirements. The controller can control the flow in adaptive and dynamic way according to the requirements. Here, the streaming requirements can be controlled by the SDN controller in such a way to improve the performance.

With the motivation to improve the performance of streaming and bandwidth utilization an efficient TSA (Tri Feature Streaming Approximation) model is presented in this paper. In most locations of the network, there will be no MIMO or Small cells located around the mobile, this affect the streaming performance. In order to maintain the streaming performance, random deployment of MIMO cells can be performed. Still, the performance of 5G network is depending on how the random deployment is performed. The detailed approach is presented in the next section.

2 SDN-Route Selection:

The SDN controller involves in the problem of SDN route selection, which is performed according to different constraints. The route selection is performed in such a way to meet the streaming performance required. The method first discovery the routes available between the source and service point. For the routes identified, for each route, the method performs streaming approximation. Based on the value of streaming support measure obtained, the method selects a top valued routes set to perform data transmission. If no such route is available, then the method performs random deployment.capable of transmitting through number of channels andin different angles using multiple radios. The presence of macro, small cells and MIMO systems supports achieving higher data rate in 5G networks.

Bandwidth utilization is the major concern in achieving higher data rate in 5G networks. In order to utilize the band-width to the maximum limit, the presence of MIMO devices and small cells should be used properly. As the mobile nodes

The random deployment is the process of deploying necessary MIMO and small cells around the location where there is huge scarcity of coverage to meet the required streaming rate. To perform this, the method first identifies the list of MIMO, Macro cell and small cells available. Also, the method identifies the amount of traffic present in the region. According to these values, the method identifies the number of MIMO to be deployed. According to this, the method selects a set of locations where the MIMO should be placed are moving in different direction, the radios present in the MIMO devices which are capable of transmitting in differ- ent angle can be used. The route selection plays vital role in utilizing the bandwidth of 5G networks. By choosing the routes with maximum MIMO devices and small cells would support achieving higher data rate and in achieving higher bandwidth utilization. This paper presents such bandwidth utilization, data rate maintenance and route selection scheme to support the performance of 5G networks. The software defined interface (SDI) can be used in achieving higher per-formance which consider Mobility aware Data Rate maintenance (MDR) scheme in achieving higher data rate to support QoS development.

3 Route Discovery:

The routes available between a source and service point has been identified according to the network topology. The location information of the mobile node used for the route discovery. It uses the location and topology information to perform route discovery. According to the location information, the method identifies the list of small, MIMO and macro cells around the location of mobile node. Based on the neighbor information and their transmission range, the method estimates the coverage measures between all the subsequent cells. Based on the value, the list of nodes falls within the transmission range of others are identified. According to this, the lists of routes available are identified. Identified routes have been used to perform route selection with TSA model.

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Route Discovery Algorithm:

Input: Topology T, Location L

Output: Route Set Rs

Start

Read Topology T, Location L.

Identify the first neighbors of mobile node N according to location L.

Initialize Node List Nl

Identify list of neighbors of N.

$Nl = \sum_{i=1}^{size(T)} T(i) <> N.TransmissionRange$

For each node n from Nl

Identify list of routes through n to reach service point Sp.Generate route request TRREQ and broadcast in the network.

Receive reply and extract Number of neighbors, congestion.

$$\text{Route Set Rs} = \int_{i=1}^{size(Nl)} \sum_{j=1}^{Niehgbors(Nl(i))} Routes(j, Sp)$$

End

Stop.

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4 Related works

In [1], the author propose a multipath routing overlay which removes the blockage introduced by the multipath routing using rateless coding. In order to provide compatibility with operational IP networks as well as the possibility of incremental deployment, these techniques can be implemented as a routing overlay. We present algorithms to compute the maximum throughput achievable through this routing overlay approach, as well as a specific scheme to implement a multipath routing overlay in an IP network. Finally, we provide results from testing this approach on a mobile wireless network with satellite communication links. In our test scenario, satellite links suffer blockage from buildings in an urban setting.

In [2], the author presents the Multi-Path Transmission Control Protocol (MPTCP) algorithm which split the flow into multiple small flows with congestion control schemes.

In [3], the author presents an optimal routing algorithm which split the layers into multiple planes to reduce the average response.

In [4], the author presents a multipath routing which combines multiple smart antennas in such a way to improve the quality of service of the network.

In [5], the author presents a Joint VNF Placement and Multicast Traffic Routing. The method considers various constraints in resource, flow rules.

In [6], the author present aNetwork Assisted Routing algorithm - NAR, to support D2D communication. The method involves in Load Balancing Based Selective Ad Hoc On-Demand Multipath Distance Vector algorithm. more effective in providing data transmission service according to different resource dynamics.

In [7], the author present a QoE-aware, SDN- based MPTCP/SR approach for service delivery. Also, QoS aware multipath routing algorithm is enforced to achieve higher performance.

In [10], the author presents a genetic and neuro fuzzy based call admission control algorithm.

In [11], the author presents the analysis of various approaches in routing in 5G networks. The methods are analyzed for their performance under different bandwidth and delay constraints.

In [12], the author presents a simulation model to analyses various methods of routing for their support in higher data rate.

In [13], the author presents an analysis on the integration of 5g and IoT in smart cities. Their performance has been measured under various constraints.

5 Tri feature feature streaming approximation.

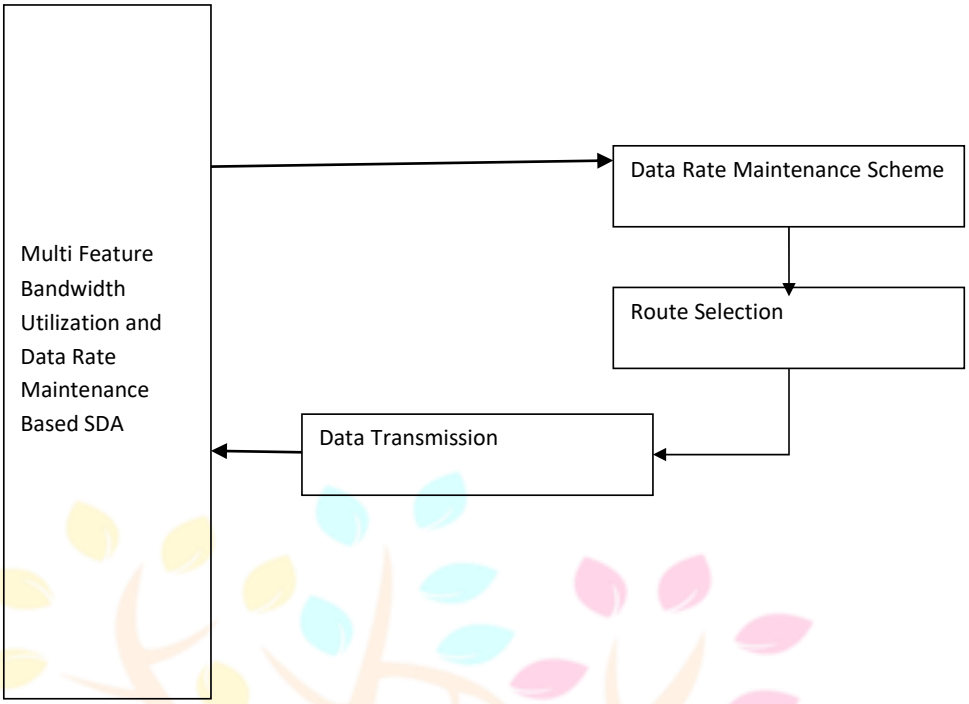
The proposed algorithm starts with route discovery at any data transmission using the topology of network which includes the macro cell, small cell, MIMO devices. Using the routes being identified, the bandwidth utilization support (BUS) and data rate maintenance (DRM) are measured for each route. Using these measures, the method estimates data transmission support (STS). According to STS, a set of routes are identified to maximize the bandwidth utilization. The selected routes are used in transmission of data.

The functional diagram of proposed scheme is presentedin Fig. 1, where each functional aspects detailed clearly in

In [8], the author considered the signal strength of the received signal. For static points, the results are presented in the form of power angular spectrum and power delay profile.

In [9], the bandwidth availability based multipath routing (RBMR) algorithm is presented The method consider the remaining bandwidth between the adjacent nodes which is used to perform route discovery.

Fig. 1 Architecture of proposed system



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6 Multi feature bandwidth utilization and data rate maintenance based SDA(BDSDA)

The proposed algorithm starts with route discovery at any data transmission using the topology of network which includes the macro cell, small cell, MIMO devices. Using the routes being identified, the bandwidth utilization support (BUS) and data rate maintenance (DRM) are measured for each route. Using these measures, the method estimates data transmission support (STS). According to STS, a set of routes are identified to maximize the bandwidth utilization. The selected routes are used in transmission of data.

The functional diagram of proposed scheme is presented in Fig. 2, where each functional aspects detailed clearly in this section.component, available routes are identified within the mobile node and service point. Identified routes are used to perform route selection and bandwidth utilization maximization anddata rate maintenance schemes

The text displayed in route discovery algorithm explains how the routes between mobile node and service point has

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For each node n from Nl

Fig. 3 Performance analysis on bandwidth utilization

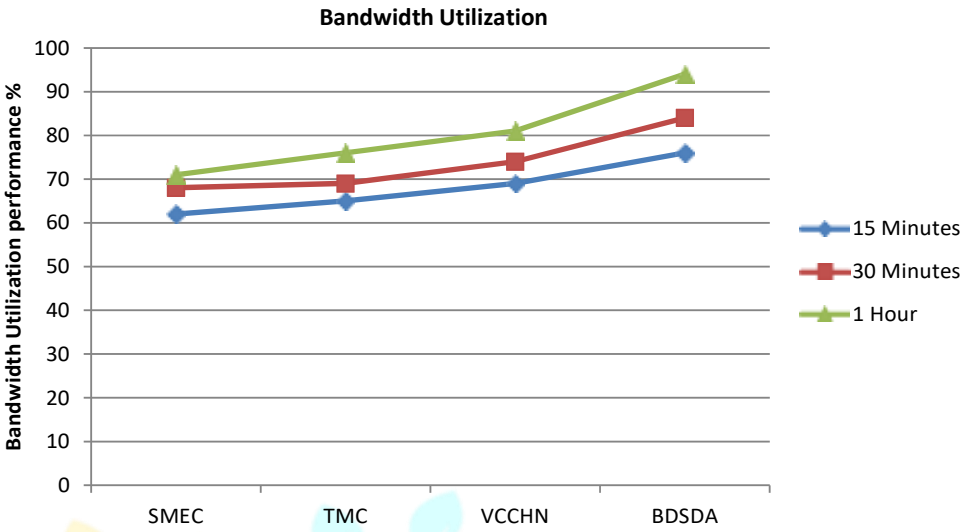


Fig. 4 Performance analysis on packet delivery ratio

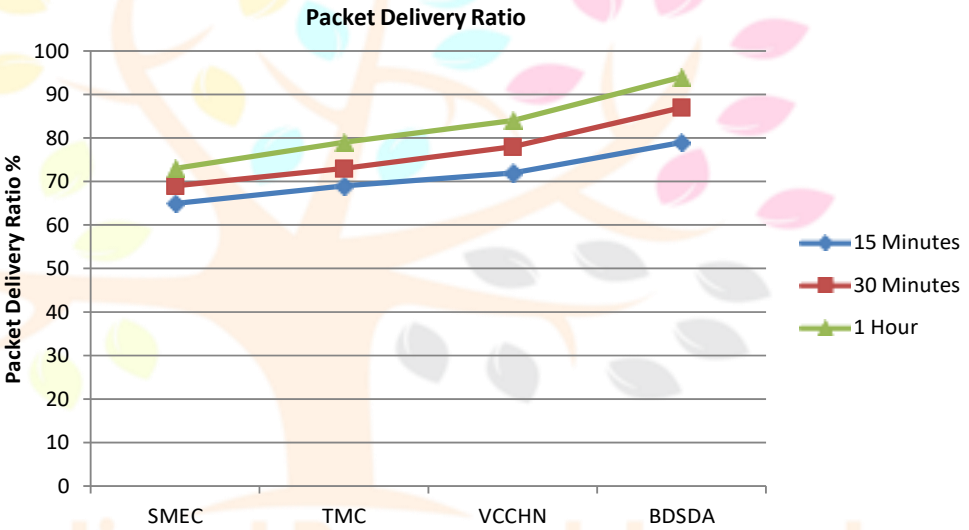
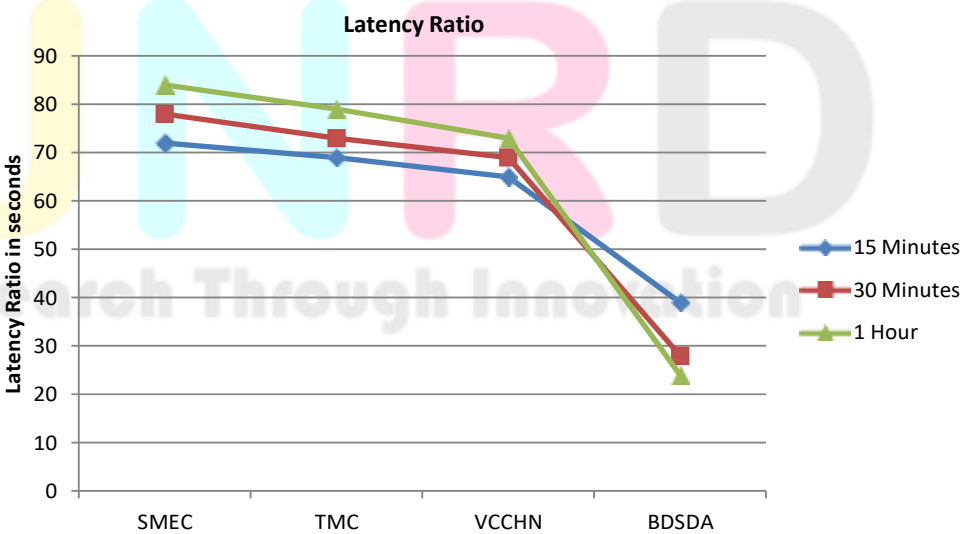


Fig.5 Performance analysis on latency ratio



B. Shrader, S. Pudlewski, L. Herrera, N. M. Jones and A. P. orthen, The routes available between a source and service point has been identified according to the network topology. The location information of the mobile node used for the route discovery. It uses the location and topology information to perform route discovery. According to the location information, the method identifies the list of small, MIMO and macro cells around the location of mobile node. Based on the neighbor information and their transmission range, the method estimates the coverage measures between all the subsequent cells. Based on the value, the list of nodes falls within the transmission range of others are identified. According to this, the lists of routes available are identified. Identified routes have been used to perform route selection with TSA model.

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End

Stop.

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