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Evaluation of Heterogeneous Wireless Network Using MOORA Method

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Abstract. Device-to-device (D2D) and heterogeneous networks are key to the success of 5G networks. Multimodal networks consist of fixed location base stations/small cells, each of which may have a different range and type of connection to a mobile network operator (MNO). wireless networks in our environment use Different access technologies, via wireless LAN Wireless network and cellular that provide the service Services can be maintained while Switching to a network It's wireless called a multicast network. Alternative: VoIP (protocol), Streaming, Web Browsing, and Transmission Control Protocol (TCP). Evaluation Preference: Allowed bandwidth, usage, Packet delay, packet jitter, packet loss to calculate the final value. MOORA system, first by Fraser Introduced, it is a multi-objective optimization technique, which is complex in various manufacturing environments Successful in solving decision-making problems. Can be used. A new method multidisciplinary development with unique alternatives has been proposed: MOORA (Multi-Objective App-Itemization based on ratio analysis). Heterogeneous Wireless Network packet loss is got the first rank whereas is the packet jitter is having the Lowest rank. The value of the dataset for Range of Heterogeneous Wireless Network in MOORA Method shows that it results in Packet Jitter and top ranking.
Keywords: Heterogeneous Wireless Network, wireless infrastructures, LTE communication technologies, WiMAX and LTE networks Integration

1. Introduction

Heterogeneous Wireless Network Also, maintenance using metric data collected during operation we propose analysis and evaluation for the system. Such an evaluation is optimal for the machine Determines operating conditions, in the same way it can establish its worst operating conditions; Each Can help management to take into account the best decisions regarding the machine. The MOORA Methods The best solution is short-range and negative- The solution determines the long distance from the best solution, but this Comparison of distances is not considered significant. Multi-Criteria Evaluation (MCE) in GIS is a variety of selected areas for a specific purpose based on characteristics It is a study of allotment of land. MCE became of compromise alternatives and alternatives according to their attractiveness Makes it possible to create rankings. A computer network where all computers are the same or have the same or similar architecture, i.e. all network nodes have the same computer. A similar Homogeneous network. Heterogeneous Information Networks Rich semantics on nodes and connections Contains information. For example, a bibliography in information networking, teachers, conferences and by different types of nodes like headers Documents are linked to each other.

2. Heterogeneous Wireless Network

Heterogeneous wireless networks A Simple Policy-Enforced Handoff System Provided, users have the best wireless system at any time, the policies on what is trading Exchanges can be made between Network characteristics and cost, performance and dynamics such as power consumption multi- Scale decision making system Access Network Implementation Selection is described in a heterogeneous network context in [1]. Help us integrate diversity Much emphasis has been placed on wireless networks Such as cellular networks, WLANs, and many MANETs include interface devices [2]. SDN- A radio resource in based wireless NFV Slicing architecture has three main advantages Contains: Spectrum Sharing is achieved in Heterogeneous wireless infrastructures are physically overwhelming in a software-based way instead of using with increased CapEx and OpEx SBSs; A center Global information on controller physical network Holds, resource without distributed information Facilitates sharing, heterogeneity QoS isolation for coexistence of different services needed. of different types Service Types. Resource for various service groups QoS isolation by creating fragments a promising approach to achieving this is resource slicing is [3]. In heterogeneous wireless networks, when is a critical task for mobile terminals Ideal for various communications anytime, anywhere Selecting a network. Which is called network selection? The latest Over the years, this topic has been the subject of various mathematical theories is widely studied using Theory used Optimization determines the scope of complexity and efficiency, and hence the mathematical potential Understand the principles and get the best result Choosing the right one is important [4]. There are some Wireless Communication Research Society Incorporated Robust next-generation communications for vehicles to provide DSRC's networking combinations with studies on Wi-Fi, WiMAX and LTE communication technologies. Also, DSRC roadside at key locations like junctions and interchanges Units are expected to be installed. Hence, the limited of DSRC Coverage and existing Wi-Fi, WiMAX and LTE

networks Integration CVT is a heterogeneous wireless network for applications [5]. IoT types Bluetooth, Wi-Fi and ZigBee are D2D Communication based. Devices across the network with human intervention or can be handled in autonomous mode. Thus avoiding human intervention, adaptation Signal strength received by MAC and physical basically layering mechanism an intelligent heterogeneous wireless network is emerging. Multi-hop wireless network for IoT applications Efficiently handle between BLE and Hallow Becomes smarter. of the received signal Basically the strength between these technologies Switching and Switching Physical and MAC layer two Methods are proposed [6]. This will create A heterogeneous wireless access environment. Network congestion and performance degradation. Evolution games in a heterogeneous wireless network using their Network selection dynamics. Size bandwidth is designed as a dynamic evolution game in wireless access networks where in different service areas Groups of users are available for sharing competitively defined [7]. Battery-efficient devices and integrated energy Requirements management tools, heterogeneous wireless network Electronic, adaptive multimedia delivery in the environment and It is a hybrid of both network selections to reduce consumption It is tempting to propose an adapter-handling solution. that uses Each element of the proposed solution is for Jack's best ride have a role in helping connection ever [8]. Heterogeneous Wireless Networks we want to know that instead of placing base stations connected to each other by a wire network, how to improve the uniformity capacity by using some more powerful wireless ad hoc networks auxiliary nodes. Note that most of the previous research assumes that the capacity network area is a square and traffic Symmetry refers to the number of raw nodes same as the number of target nodes. However, those Special cases only [9]. Although there is previous work that considered wireless caching Algorithms do don't for layered video content and different layers consider the relationship between This paper is a Layered video in a heterogeneous wireless network examines content placement optimization problem of streaming; its purpose is to average over a distributed caching network Reducing user download time [10].

3. MOORA Method

A multi-objective optimization procedure Also known as simultaneously upgrading multiple criteria or multiple attribute optimizations is subject to some restrictions on conflicting attributes. To make optimal decisions in the presence of industry, automobile design or business transactions a variety of fields of interest. Two. Or Conflicting motives. Increasing profits and lowering the price of an item; Reducing performance and vehicle fuel consumptionThe MOORA method demonstrates compatibility and ability to solve many Objective decision making problems in a real-time manufacturing environment. The following six illustrative examples are considered. It is recommended to use the MOORA method, as decision making in a production environment is very much from them It helps to select the appropriate option, out of many candidate alternatives for a given problem Figure Six illustrative examples illustrate the effectiveness of this method There Arein all cases, first alternatives are the same as those obtained by researchers in the past There are. There are minor discrepancies Between intermediate ranks of This may be due to subjective judgments made by decision makers alternatives.Consider all the properties that can be found in The MOORA mode is relatively important for them, so it can provide the best accurate estimate. Of alternatives.These explanations Facilities in Lithuania were tested by applications in the field. The application has several purposes: Costs, experience and performance of contractors; Quality of owners, duration of work and price. These purposes having different units avoid difficulties in the dimensional proportions of the MOORA system Normalization. These ratios were consolidated in the first part of the MOORA, and they were in the second Used away from A reference point. The results of the two types are each other control, it is a test of strength. Ratio Multi-Objective by Analysis System (MOORA). Optimization Advanced nominal panel technique and Delphi 6 conditions are fulfilled with the help of method. Additionally, MOORA Multi- Objective Optimization 2 satisfies the seventh condition to some extent using different methods. MOORA is a very strong organization because no other organization meets the 7 conditions are best. Dimensionless measurements The MOORA method is based on 2 parts Contains: integration of dimensionless ratios and These rates are applied to the reference distance point.Minimal mathematical calculations with a strong background in mathematics, based only in very effective simple ratio analysis useful for those who are indecisive. Also, the calculation time of the MOORA method is apparently shorter. Similarly, other MODM methods require separate software to perform the task but MOORA method works in MS Let's Excel. For this reason, The MOORA method is highly efficient for various decision problems Quality. Compared to other MODM systems like SVR, NN, GA, TM, GRA, GRG, The OORA method is simple and easy to implement. as in the Decision-making problem.

4. Analysis and Discussion

Hetereogeneous Wireless Networkthe VoIP (protocol) Packet Loss shows higher value, Packet Jitter Lower Displays the value. Streaming influences packet loss too Shows high value the Packet delay is showing the lowest value. Web Browsing it is seen that Packet delay is showing the highest value for Packet Jitter is showing the lowest value. Transmission Control Protocol (TCP)it is seen that Packet Loss is showing the highest value for Allowed Bandwidth is showing the lowest value.

TABLE 1. Heterogeneous Wireless Network

	VoIP(protocol)	Streaming	Web Browsing	Transmission Control Protocol (TCP)
Allowed Bandwidth	51.08	179.53	39.15	32.05
Utilization	49.12	192.97	36.69	37.30
Packet delay	44.08	182.58	39.18	33.10
Packet Jitter	43.17	158.28	34.60	37.59
Packet Loss	53.33	286.41	37.96	38.89

Table 1 shows the Heterogeneous Wireless NetworkAlternative: VoIP(protocol), Streaming,Web Browsing, and Transmission Control Protocol (TCP). Evaluation Preference: Allowed Bandwidth, Utilization, Packet delay, Packet Jitter, Packet Loss to calculate the final value.

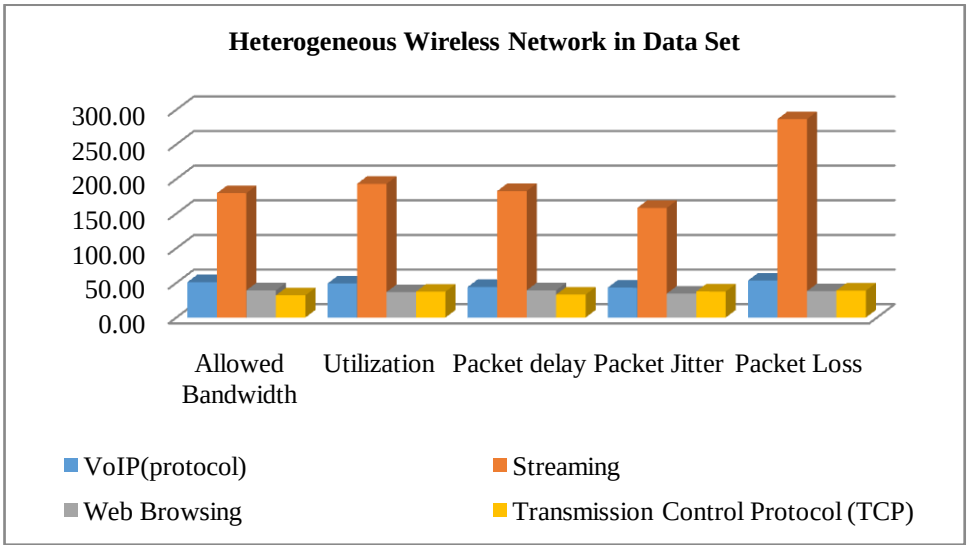

FIGURE 1. Hetereogeneous Wireless Network in **Data** Set

Figure 1Heterogeneous Wireless Networkthe VoIP(protocol)Packet Loss shows higher value, Packet Jitter Lower Displays the value. Streaming influences packet loss too Shows high value the Packet delay is showing the lowest value. Web Browsing it is seen that Packet delay is showing the highest value for Packet Jitter is showing the lowest value. Transmission Control Protocol (TCP)it is seen that Packet Loss is showing the highest value for Allowed Bandwidth is showing the lowest value.

TABLE 2. Normalized Data

	VoIP(protocol)	Streaming	Web Browsing	Transmission Control Protocol (TCP)
Allowed Bandwidth	0.472786	0.391872	0.466201	0.399
Utilization	0.454645	0.421208	0.436907	0.465
Packet delay	0.407996	0.398529	0.466558	0.412
Packet Jitter	0.399573	0.345488	0.412019	0.468
Packet Loss	0.493612	0.625166	0.452031	0.485

$$X_{n1} = \frac{X1}{\sqrt{((X1)^2+(X2)^2+(X3)^2\ldots)}} \qquad (1).$$

Table 2 shows the various Normalized Data Hetereogeneous Wireless Networkthe VoIP(protocol)Packet Loss shows a higher value, Packet Jitter shows a lower value. Streaming influences packet loss to The higher the value, the lower the packet delay. Packet latency shows high value in web browsing, Packet Jitter shows a low value. Transmission Control Protocol (TCP) packet loss is the maximum allowed bandwidth Shows the value Shows the lowest value The normalized value is obtained using the formula (1). Table 3 for analysis Displays the weights used. We took the same weight for all the parameters for analysis.

TABLE 3. Heterogeneous Wireless Network in Weightage

	VoIP(protocol)	Streaming	Web Browsing	Transmission Control Protocol (TCP)
Allowed Bandwidth	0.25	0.25	0.25	0.25
Utilization	0.25	0.25	0.25	0.25
Packet delay	0.25	0.25	0.25	0.25
Packet Jitter	0.25	0.25	0.25	0.25
Packet Loss	0.25	0.25	0.25	0.25

Table 3 shows the weight of the Hetereogeneous Wireless Networkthe weight is equal for all the value in the set of data in the table 1. The weight is multiplied with the previous table to get the next value.

$$\boldsymbol{X_{wnormal1}} = X_{n1} \times w_1(2).$$

TABLE 4. Heterogeneous Wireless Network in Weighted normalized decision matrix

	VoIP(protocol)	Streaming	Web Browsing	Transmission Control Protocol (TCP)
Allowed Bandwidth	0.1	0.097968	0.117	0.1
Utilization	0.1	0.105302	0.109	0.116
Packet delay	0.1	0.099632	0.117	0.103
Packet Jitter	0.1	0.086372	0.103	0.117
Packet Loss	0.1	0.156291	0.113	0.121

Table 4 shows the weighted normalization decision matrix it is calculated by multiplying the weight and performance value in table 2 and table 3

TABLE 5. Heterogeneous Wireless Network in Assessment value

	Assessment value
Allowed Bandwidth	-0.00023
Utilization	-0.00647
Packet delay	-0.01813
Packet Jitter	-0.03385
Packet Loss	0.045529

$$\text{Assesment value} = \sum X_{wn1} + X_{wn2} - X_{wn3} \qquad (3).$$

Table 5 shows the graphical representation Discordance Micro Heterogeneous Wireless Network in Assessment value of the Packet Loss 1st value, Allowed Bandwidth 2nd value, Utilization 3rd value, Packet delay 4th value, Packet Jitter 5th value

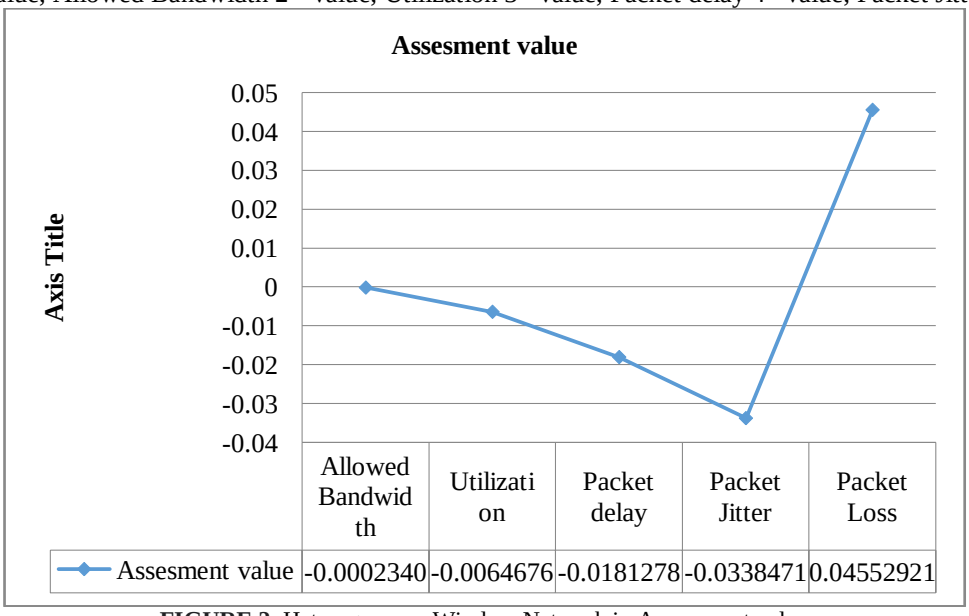

FIGURE 2. Heterogeneous Wireless Network in Assessment value

Figure 2 shows the graphical representation Discordance Micro Heterogeneous Wireless Network in Assessment value of the Packet Loss 1st value, Allowed Bandwidth 2nd value, Utilization 3rd value, Packet delay 4th value, Packet Jitter 5th value.

TABLE 6. Heterogeneous Wireless Network in Assessment value

	Rank
Allowed Bandwidth	2
Utilization	3
Packet delay	4
Packet Jitter	5
Packet Loss	1

Table 6 shows that Heterogeneous Wireless Network packet loss is got the first rank whereas is the packet jitter is having the Lowest rank.

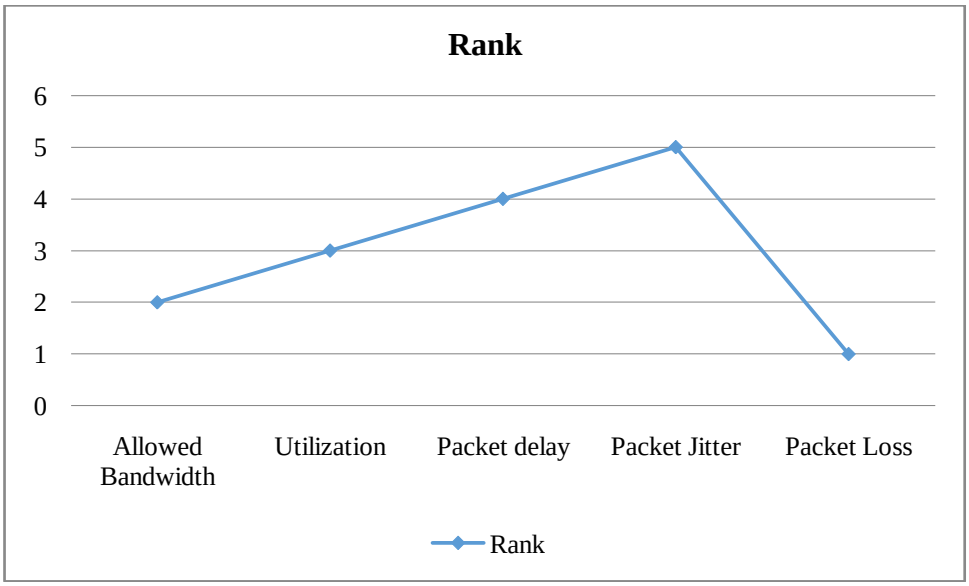

FIGURE 3. Shown the Rank

Figure 3 shows that Heterogeneous Wireless Network packet loss is got the first rank whereas is the packet jitter is having the lowest rank.

5. Conclusion

Heterogeneous wireless networks A Simple Policy-Enforced Handoff System Provided, users have the best wireless system at any time, the policies on what is trading Exchanges can be made between Network characteristics and cost, performance and dynamics such as power consumption multi- Scale decision making system The MOORA method demonstrates compatibility and ability to solve many Objective decision making problems in a real-time manufacturing environment. The following six illustrative examples are considered. It is recommended to use the MOORA method, as decision making in a production environment is very much from them It helps to select the appropriate option, out of many candidate alternatives for a given problem Figure Six illustrative examples illustrate the effectiveness of this method There Arein all cases, first alternatives are the same as those obtained by researchers in the past There are.Ratio Multi-Objective by Analysis System (MOORA). Optimization Advanced nominal panel technique and Delphi 6 conditions are fulfilled with the help of method. Additionally, MOORA Multi- Objective Optimization 2 satisfies the seventh condition to some extent using different methods.Heterogeneous Wireless Network packet loss is got the first rank whereas is the packet jitter is having the Lowest rank

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