CHAPTER 8

TESTING AND RESULTS

8.1 Results and Discussions

Comparative results of the protocols with the already existing context aware message oriented middleware were studied and it was found that the efficiency of the proposed work was found to be higher than the already existing work. For quantitative comparison, the proposed system is compared to the REMMOC architecture. The data considered are the component insertion and memory footprint. For qualitative analysis the data considered are various parameters of routing and service discovery protocols.

8.2 Qualitative Results of Protocols on Middleware

Application: The application taken into consideration is the “Smart Campus” taking into account admission, job, library and medical module. When the student enters the campus, he/she must be given access to all the four modules seamlessly. Interoperability of the protocols is done at the middleware and the performance of the protocols are studied.

The performance evaluation is carried out using ns2 [53] simulator with 50 nodes. Proactive protocols are selected for admission and medical module and reactive protocols are selected for job and library. The selection of protocol is done spontaneously. The proactive protocol in the proposed work is DSDV and the reactive protocol is AODV. The nodes are assumed such that 0-14 nodes are
static, 15-29 are mobile and 30-49 are sensors. The transport agent descriptions are as follows 0-19 works on SLP with DSDV protocol, 20-34 work on PDP and AODV protocol and 35-49 work on UPnP and (AODV+DSDV protocol). Similarly in the service description of the modules 0-19 are the students admission module, 20-34 are job modules and 35-39 constitute medical modules and 40-49 constitute library module. The result of interoperability of protocols at the designed middleware is compared to the work of context aware message oriented middleware with CAR protocol [18]. AODV + DSDV is a state of routing, where the system chooses AODV to route till a particular hop and from there the DSDV protocol is chosen to route till the destination. The results shown below are got from multiple simulation runs. Each point in the graph is the average result of 10 random simulations. The number of nodes is decided based on the simulation environment.

![Graph](image)

**Fig. 8.1 Rate Vs delay (Admission).**
From the Fig 8.1, it could be inferred (concluded) that the delay increases with the rate of transmission but the rate of delay is smaller than the already existing message oriented middleware with CAR protocol. Through the admission module the students can seek admission to any course of like in the campus.

![Fig. 8.1.1 Time Vs Delay (Admission).](image)

It could be inferred from the Fig. 8.1.1, that in the admission module, the delay initially remains constant with time and then further increases and remains constant after certain interval of time. The ratio is marginally equivalent to the existing work at the initial stage and efficiency is improved as the time interval increases.
Fig. 8.1.2 Rate Vs Delratio (Admission).

From the Fig 8.1.2, it could be inferred that the delivery ratio is higher in the proposed work when rate of transmission is considered. The delivery ratio is constant throughout, thereby increasing the efficiency. The delivery ratio refers to the speed in the delivery of service from the nearest service offering node.
Fig. 8.1.3 Time Vs Delratio (Admission).

From the Fig 8.1.3, it could be inferred that in the proposed work the delivery rate is higher with time. But it is found that initially the delivery efficiency is almost equivalent to the already existing middleware with CAR Protocol. It requires improvement in increasing the efficiency at the start of transmission.
From the Fig 8.1.4, it could be inferred that as the rate of transmission increases the drop ratio also increases which requires improvement. It is found that the performance is marginally equivalent to the already existing work of message oriented middleware with CAR protocol.
Fig. 8.1.5 Time Vs Drop (Admission).

From the Fig 8.1.5, it could be inferred the drop in transmission increases with time in the proposed work but is smaller than the already existing message oriented middleware with CAR protocol.
From the Fig 8.2, it could be inferred that the delay decreases steadily, increases to a certain extent and further decreases. But the performance is higher than the already existing middleware.
From the Fig 8.2.1, it could be inferred that the delay increases with time steadily which terms to be negative. But it is seen that the delay is lower than the existing message oriented middleware with CAR protocol.
From the Fig 8.2.2, it could be inferred that the delivery ratio initially declines and further increases and then decreases with respect to the rate of transmission. But the rate of efficiency is higher than the message oriented middleware with CAR protocol.
From the Fig 8.2.3, it could be inferred that the delivery ratio steadily decreases with time which is a negative factor. But the efficiency of delivery is higher than the message oriented middleware with CAR protocol.
From the Fig 8.2.4, it could be inferred that as the rate of transmission increases, the drop ratio increases and is marginally equivalent to the already existing system. It requires improvement in efficiency further.
From the Fig 8.2.5, it could be inferred that as the time increases the drop ratio steadily increases. But the drop ratio of the proposed work is steady and lesser than the compared work. Where as in the already existing work the drop ratio is variant across time. Drop ratio further requires improvement in the proposed architecture.
From the Fig 8.3, it could be inferred that in the library module, the delay increases steadily then suddenly decreases and remains steady constant for a longer rate of transmission and further increases. But the delay is smaller than the already existing model of message oriented middleware with CAR protocol.
From the Fig 8.3.1, it could be inferred that the delay increases with time and further remains a constant for a longer period of time. The efficiency is to be improved in the proposed architecture.
From the Fig 8.3.2, it could be inferred that the delivery ratio varies along with the rate of transmission. Rate of delivery is almost marginally equivalent to the existing system at the starting stage and further increases in the proposed middleware.
From the Fig 8.3.3, it could be inferred that the delivery ratio constantly decreases with time. But the performance is efficient than the message oriented middleware with CAR protocol.
Fig. 8.3.4 Rate Vs Drop (Library).

From the Fig 8.3.4, it could be inferred that the drop ratio first decreases with the rate of transmission and further steadily increases but is smaller than the already existing work of message oriented middleware with CAR protocol.
Fig. 8.3.5 Time Vs Drop (Library).

From the Fig 8.3.5, it could be inferred that the drop ratio steadily increase with time. But is lesser than the already existing work of message oriented middleware with CAR protocol. In the already existing work, the drop ratio is relatively higher than the proposed work.
Fig. 8.4 Rate Vs Delay (Medical).

From the Fig 8.4, it could be inferred that the delay increases initially and then declines, further increases and remains a constant. But this delay is smaller than the already existing message oriented middleware with CAR Protocol.
In the Fig 8.4.1, delay remains constant with time, further increases and remains steady constant. The efficiency is much higher than the already existing system.
Fig. 8.4.2 Rate Vs Delratio (Medical).

From the Fig 8.4.2, it could be inferred that the delivery ratio decreases with rate of transmission, but the efficiency of delivery is much higher than the existing system.
From the Fig 8.4.3, it could be inferred that the delivery ratio decreases with time in the proposed work. But the decrease is a steady decrease with much efficiency.
From the Fig 8.4.4, it could be inferred that the drop ratio increase with rate of transmission in the medical module. The drop rate is marginally smaller than the message oriented middleware with CAR protocol. The performance could be improved further.
From the Fig 8.4.5, it could be inferred (Concluded) that the drop ratio increases with time in the medical module. But the drop ratio is marginally smaller than the already existing message oriented middleware with CAR protocol. This chapter provides the simulation results of the performance of the protocols. The next chapter concludes the thesis giving a comparative discussion of the performance of the protocols on the proposed middleware with the existing similar middleware and also points out further work.