International Journal of Engineering Research and Development
e-ISSN : 2278-067X, p-ISSN : 2278-800X, www.ijerd.com
Volume 2, Issue 5 (July 2012), PP. 54-59

Design of Context Aware Vertical Handoff

Prof. Sunita Sharma[1], S.K.Bodhe [2]
[1]*Watumull College of Electronics Engineering and Computer Technology, Mumbai University, India*
[2]*Principal, Pandharpur College of Engineering, Maharashtra, India*

Abstract —This work strives for mobile nodes to execute handoff decisions in an optimal way depending on the context. This requires a dedicated procedure to efficiently collect and manage context information and an appropriate platform to use that information for a most favorable handoff decision.

I. INTRODUCTION

In cellular networks such as GSM, a call is seamlessly handed over from one cell to another using hard handoff without the loss of voice data. This is managed by networks based handoff control mechanisms that detect when a user is in a handoff zone between cells and redirect the voice data at the appropriate moment to the mobile node via the cell that the mobile node has just entered. In 4G networks a handoff between different networks is required. A handoff between different networks is referred to as a Vertical handoff (VHO).

II. DESIGN OF CONTEXT AWARE VERTICAL HANDOFF

This work strives for mobile nodes to execute handoff decisions in an optimal way depending on the context. This requires a dedicated procedure to efficiently collect and manage context information and an appropriate platform to use that information for a most favorable handoff decision [1].

III. INTRODUCTION TO CONTEXT AWARE HANDOFF

Context information may be classified as static or dynamic, depending on the frequency and reason of changes. It can be classified also based on where such information is maintained. Some pieces of information, such as the user's profile, appear twice, as the information is often spread over the user's device, the operator's network and possibly over several service providers. As an example, the user's profile may include subscribed services and service preferences, e.g., which services have to be downgraded or dropped if available resources are not sufficient. The potential next AP, nearby APs, user history, and user mobility can be used for location prediction and limit the options for selecting the next AP. It will help simplifying the selection of the best AP. The user's settings for applications and the types of the ongoing applications indicate the preferable QoS level, etc.

We need a context management framework, which assures that the context information needed for handoff decisions is available in time (before the handoff decision needs to be made) [2]. Moreover, exchange of information between the network and the mobile nodes should be minimized to save wireless resources. Furthermore, a context-aware handoff requires an appropriate execution platform, which is flexible enough to adapt to the changing requirements of this service. It should be able to cope with dynamic context and automatically alter the handoff decision policy or the algorithm in use. It should support continuous exchange of context information between the nodes involved in the handoff service in an efficient way. It should also enable the mobility manager of the mobile node to take the right handoff decision.

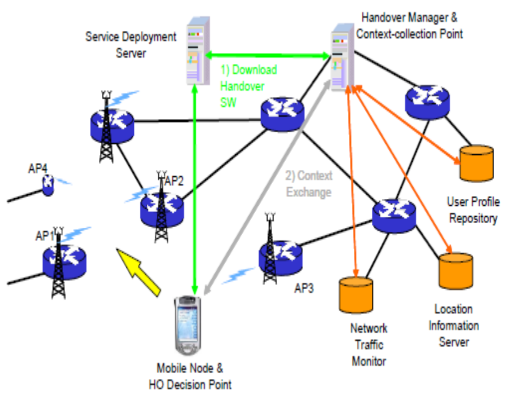

Fig 1: Basic architecture of Context aware Management Architecture

IV. CONTEXT AWARE VERTICAL HANDOFF PROCEDURE

In this research we are designed the vertical handoff which takes into consideration the context generated in the network [3].

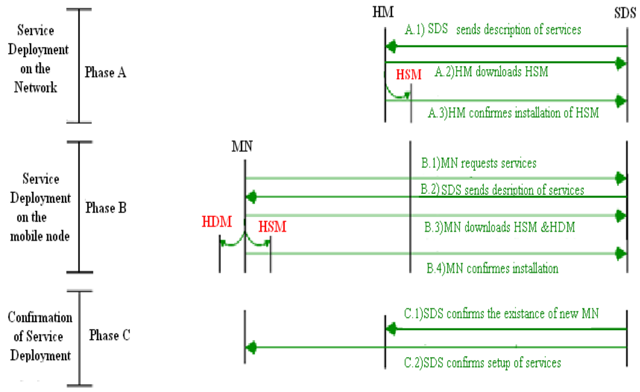

Figure 2: Sequence of Signaling for Service Deployment

The realization of our context-aware handoff service can be divided into five phases, which are explained in the message sequence diagrams shown in Figure 2 and Figure 3. Phases A through C are referring to the service deployment mechanism. During Phase D relevant context information is collected. In Phase E, the context information is evaluated and handoff decisions are made.

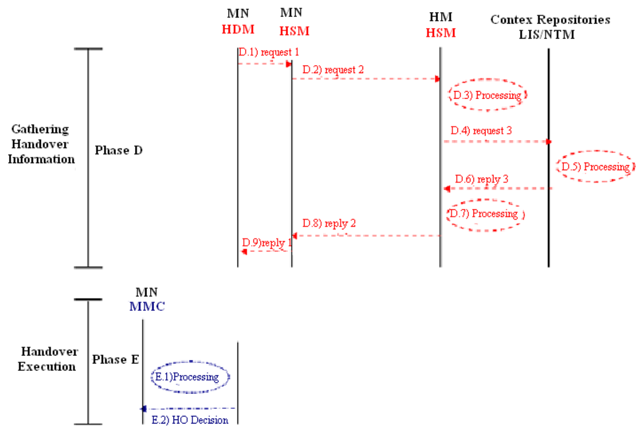

Figure 3: Sequence of Signaling and Processing for Context-aware Handoff

The service deployment phases include: fetching the right service components; installing them on the appropriate network node; and confirming the successful installation of all the components for that service. The HDM is installed on the mobile node, and the HSM is installed on both the mobile node and the HM. More specifically, here we need to install appropriate versions of both the HSM and HDM on the programmable platforms of the mobile node and HM. This is realized by the service deployment mechanism in Phase A, B and C [4].

We assume that the SDS will trigger the module installation in the HM using the concept of service broadcast, since the location and role of the HM are "fixed" comparing to the mobile node. On the other hand, the modules in the mobile node are very dependent on the terminal and the user. The terminal can move frequently from one network to another, or change its service. Therefore, it is better to have the mobile node initiating the module download with its requested service. Whenever the conditions change in the mobile node, new requests will be sent to the SDS for new services. The signaling used by the HDM to request the needed context information is detailed in Phase D. Context information needed for handoff decision is requested using server-client based mechanism. The HDM is the client of the HM, since the HM is the client of the Contextrepositories. After the HDM makes the decision on the target AP based on the collected context information, in Phase E the decision is sent to the *Mobility Management Component* (MMC) of the mobile node to execute the handoff [5].

V. RESULTS OF CONTEXT AWARE HANDOFF ALGORITHM

To keep the consistency in the comparison, we have simulated the context aware handoff algorithm to convey results in terms of number of handoff generated, delay and dropping probability Figure 4 shows the performance of context aware handoff algorithm compared with CBSF handoff algorithms. In case of context aware handoff algorithm the number of vertical handoff generated are less, this is because the design is such that the network *a priori* estimates the information pertaining to a call/data transfer.

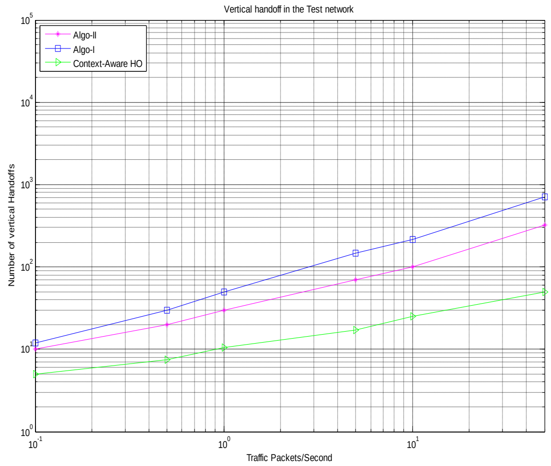

Fig4: Comparison of Delay Performance

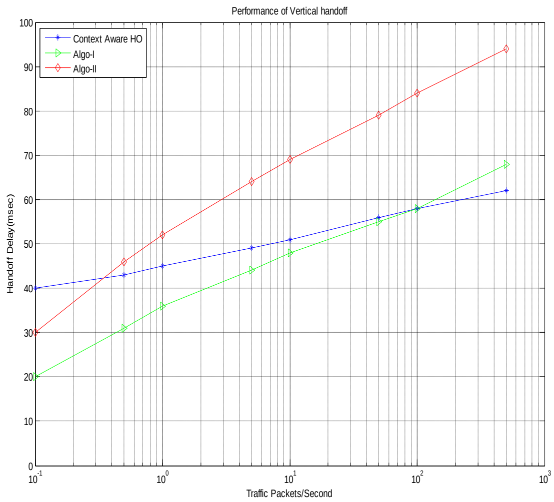

Figure 5: shows the performance in terms of delay.

The delay performance of context aware handoff algorithm is much enhanced as compared to CBSF handoff algorithms. For lower traffic it is higher than CBSF but for higher traffic it is less. Further it is observed that the performance of context aware handoff algorithm results very low variance in the delay for variable CBR traffic. (mean = 50.5 ms and σ = 59.71). This is the best feature of the designed algorithm.

In this research, the performance of network is evaluated in terms of dropping probability [6]. In number of investigations, the performance is measured in terms of complexity of the handoff algorithm. Figure 6.illustrate the outcome of the simulation carried out for context aware handoff algorithm and shows the comparison with CFBS algorithms. From Figure 6, it is observed that the context aware handoff algorithm outperforms the CFBS algorithms, but for low traffic its performance is equal to the **algo-II** (CFBS) for CBR traffic. For traffic of 100 packets per second **algo-II** gives a dropping probability of 5×10^{-3} and the context aware algorithm results into 5×10^{-5}. Further it is observed that the variation of the dropping probability for context aware handoff algorithm with respect to traffic is less, which suggests that the designed algorithm is better for large variations in the traffic pattern.

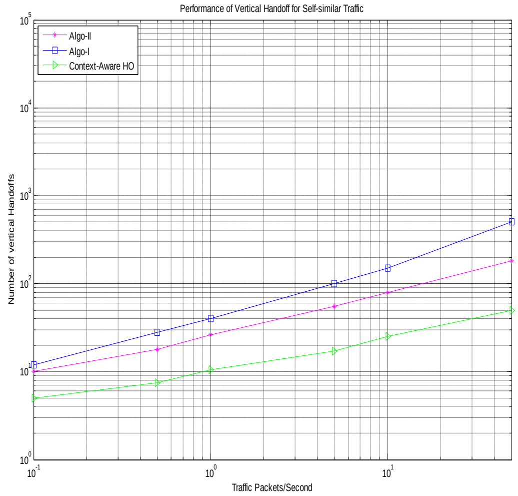

Figure 6: Dropping Probability performance of Context aware Handoff. (CBR)

To demonstrate the applicability of the context aware handoff algorithm, the network for self-similar traffic was designed.

Figure 7 shows the results for number of handoffs generated. It is observed that the performance of designed algorithm is the same as that of CBR.

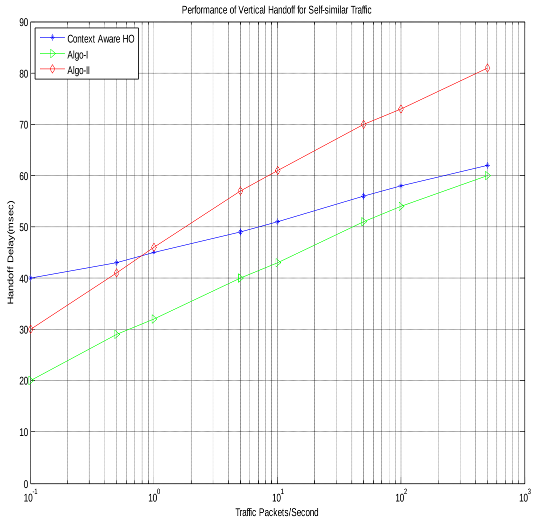

Figure 7:Performance of Context aware Handoff (Self-similar Traffic)

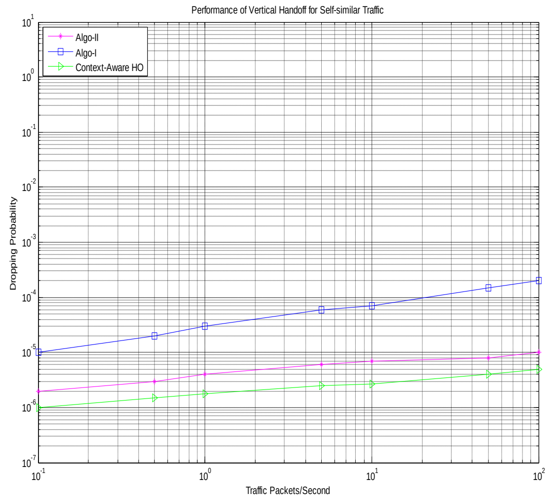

Figure 8: Comparison of Delay Performance. (Self-similar Traffic)

Figure 8 shows the performance of context aware handoff algorithm in terms of delay. Table V shows the comparison of delay characteristics for CBR and self-similar traffic. From figure 8 and Table V, it is observed that **algo-I** gives minimum mean delay for CBR and self-similar traffic but the variance is not the minimum. Context aware handoff algorithm offers moderate mean delay and the variance is minimum of all the three algorithms in discussion.

Table 1*:* Comparison of Delay Characteristics

	CBR Traffic		**Self-similar Traffic**	
	Mean	**Variance**	**Mean**	**Variance**
Context-Aware HO	50.5	59.71	50.5	59.71
Algo-I	45	244.28	41.12	185.83
Algo-II	64.75	452.78	57.37	303.12

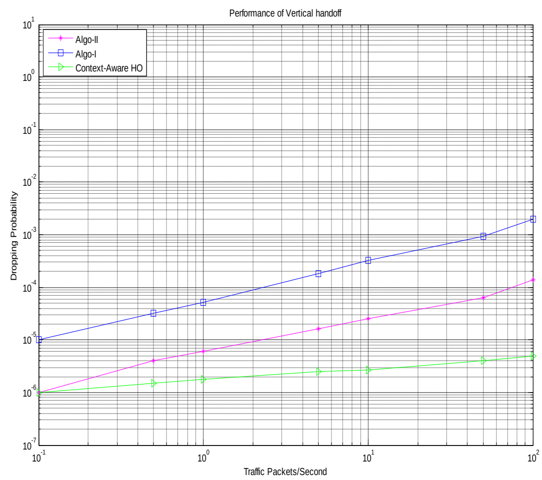

Figure 9: Dropping Probability performance of Context Aware Handoff. (Self-similar Traffic)

Table 2: Comparison of Dropping Probability

	CBR Traffic	**Self-similar Traffic**
Context-Aware HO	0.0000025	0.0000025
Algo-II	0.00018	0.000006
Algo-I	0.00018	0.00006

VI. CONCLUDING REMARKS

In this chapter, the concept of vertical handoff has been presented. To demonstrate the design of new context based handoff algorithm, the analysis and performance evaluation of CFBS vertical handoff, in which two variants have been designed and evaluated, has been presented first. Number of researchers dealt with the performance of vertical handoff for complexity, throughput, etc. In this research, the dropping probability and delay characteristics have been considered as the major performance metrics. To improve the performance of the network, a context aware handoff algorithm has been designed and shown that it out performs the adaptive vertical handoffs giving moderate rise in delay characteristics. Most importantly, the experimental work has been carried out to test the algorithms under considerations for CBR as well as self-similar traffic.

REFERENCES

[1]. Salamah, M.; Tansu, F.; "On The Vertical Handoff Performance for Interworking between Microcellular and Macrocellular Networks" Wireless and Mobile Communications, 2006. ICWMC '06. International Conference on; pp: 80, 2006

[2]. Su Kyoung Lee; Sriram, K.; Kyungsoo Kim; Jong Hyup Lee; Yoon Hyuk Kim; Golmie, N.; "Vertical Handoff Decision Algorithm Providing Optimized Performance in Heterogeneous Wireless Networks" Global Telecommunications Conference, 200. IEEE ; pp: 5164 – 5169, 2007

[3]. Zahran, A.H.; Sreenan, C.J.; "Extended Handover Keying and Modified IEEE 802.21 Resource Query Approach for Improving Vertical Handoff Performance" New Technologies, Mobility and Security (NTMS), 2011 4th IFIP International Conference on; pp: 1 – 7, 2011

[4]. Bernaschi, M.; Cacace, F.; Iannello, G.; "Vertical handoff performance in heterogeneous networks" Parallel Processing Workshops, 2004. ICPP 2004 Workshops. Proceedings. 2004 International Conference ;pp: 100 – 107, 2004

[5]. Syuhada, M.Z.A.; Mahamod, I.; Firuz, "Performance Evaluation of Vertical Handoff in Fourth Generation (4G) Networks Model" W.A.W.N.S.; Telecommunication Technologies 2008 and 2008 2nd Malaysia Conference on Photonics. NCTT-MCP 2008. 6th National Conference ; pp: 392 – 398;2008

[6]. Gowrishankar; Ramesh Babu, H.S.; Sekhar, G.N.; Satyanarayana, P.S.; "Performance Evaluation of Vertical Handoff in Wireless Data Networks" Wireless Communications, Networking and Mobile Computing, 2008. WiCOM '08. 4th International Conference on; pp: 1 – 4,2008