*ISSN: 2278 – 1323*
*International Journal of Advanced Research in Computer Engineering & Technology*
*Volume 1, Issue 3, May2012*

# End-User Controlled Vertical Handover Procedure for 4G Wireless Access Networks

M. Gopu, Dr. Ritesh Khanna

*Abstract*

This paper proposes a user terminal-controlled mobility management across heterogeneous networks without architectural changes in existing infrastructure. It describes a user-centric approach for vertical handover management. The user-centric network selection at the terminal supports seamless terminal-initiated and terminal-controlled vertical handover. It enables the mobile terminals to select the most suitable access network .Existing handoff methods are disconnection oriented, if the signal strength is considerably low then hand off is initiated. These kind of handoff doesn't take any other factors into account. the proposed method handles handoff in a user preferred way. Whenever user want the terminal can force a handoff. It provides the user a way to get connected to the preferred network or service.

Index terms: handover, mobility management, roaming

## I . INTRODUCTION

The handover management is based on the enhanced functionalities at the terminal side. The terminal must be equipped with multiple radio interfaces to access different access network technologies. The equipment must collect all available information from the surrounding access networks. This information is used for managing radio interfaces, identifying the need for handover, and selecting the best access network among available ones. This is performed by the terminal, when it is powered on or when it moves across different radio coverage types, in order to find available access networks. This function allows determining a generic set of parameters describing access networks and devices. Different type of elements that the terminal looks for are type of access network technology, access network operator, QoS etc. In addition, the information related to the QoS status of the current running applications, the mobile terminal's velocity and the cell coverage radius is also collected. The access network characteristics identify the available access networks and their radio link quality. Such information is measured by the physical radio interfaces periodically or when an event occurs. The terminal capabilities information is related to multimode capacity, available radio interfaces and remaining battery. It can influence the network selection and handover management.

## II. END USER CONTROLLED HANDOFF

The user tries to identity for different access networks and subscribed services, user preferences, and mobility policy repository. In end user controlled handoff, user preferences which is a rating relationship among the parameters is vital considered in network selection. Each preference has a relative weight that users assign to each criterion depending on their requirements. User preferences should be adequately configured for different contexts which are characterized by currently connected access node, terminal's velocity and running applications class. The terminal can maintain the mobility policy database that contains a black list. Based on the gathered information, the interface management will decide to turn on, stand by or turn off one or more radio interfaces to optimize the power consumption. Interface management becomes thus a constraint for network selection.

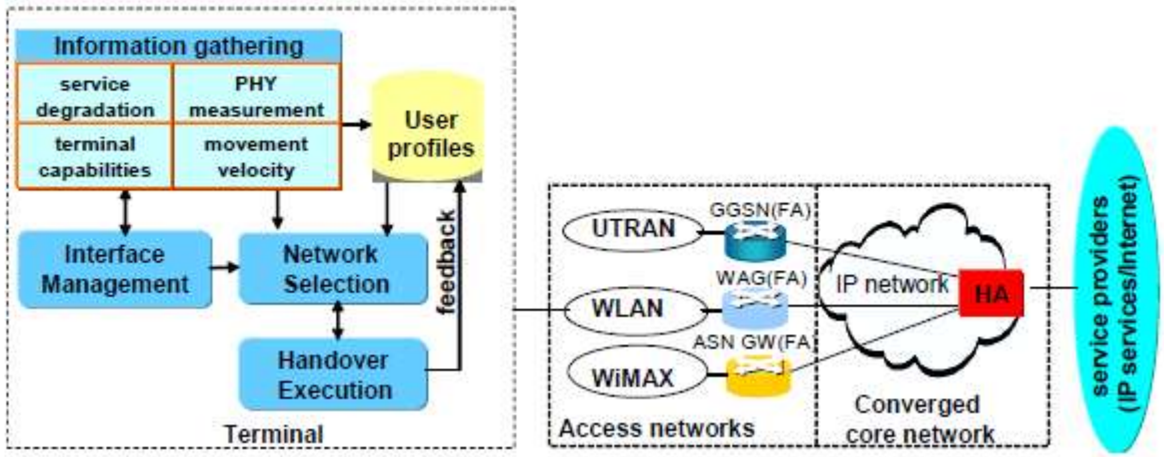


Fig1 heterogeneous network architecture

### III. NETWORK SELECTION

It refers to the process of deciding to which access network to connect at any point of time. This allows the best access network to be selected and handover to this access network to be initiated. In fact, based on the gathered information, the available interfaces, the user preferences and the black list, mobile terminal evaluates the neighboring access networks and select the most suitable one. Network selection is the heart of the handover procedure and a key decision enforcement of the terminal-controlled mobility management. Once the selected access network differs from the serving one, the handover execution is performed. The main goal of handover execution is to preserve session continuity while changing the point of attachment. If the handover fails, the network selection will attempt to select another access network.

It is widely accepted that the 4G networks will be purely IP-based. Service continuity can be achieved using mobile information protocol with help of the home agent deployed in the converged core network. The home agent, which is not located in a particular access network, can provide the mobility management as a service for mobile users. The mobility management is thus seen as an independent third party service. Such integration of access networks can be referred to as a very loose-coupling interworking since the corresponding network operators may not have any Service Level Agreement (SLA) between them. The coupling point is located far from the radio interface. The proposed interworking architecture is depicted in Figure1. Using does not affect our terminal-controlled solution since the home agent is located in the IP converged core network. In an IPv4-based network, we even do not need to implement foreign agent entities in a particular access network since there exist solutions for MIPv4 management without it. The access networks thus remain unchanged in the very loose coupling architecture.

## IV. INTERFACE MANAGEMENT

User profiles contain the user's identities for different access networks and subscribed services, user preferences, and mobility policy repository. In the context of the terminal-controlled mobility management, we are first interested in user preferences, which is a rating relationship among the parameters considered in network selection. Each preference has a relative weight that users assign to each criterion depending on their requirements. User preferences should be adequately configured for different contexts which are characterized by currently connected access node, terminal's velocity and running applications class. As user preferences influence the network selection and handover management process, future terminals will have to provide users with the facilities (e.g., Graphical User Interface dedicated to user preferences configuration) to specify and alter their preferences in an easy manner. Additionally, the terminal can maintain the mobility policy database that contains a black list of access network operators with whom the user has had a bad experience. The black list will be updated through feedback from handover execution failure and bad QoS as perceived by the application. The users can manually pre-specify the black list and remove a specific access network from this list. Based on the gathered information, the interface management will decide to turn on, stand by or turn off one or more radio interfaces to optimize the power consumption. Interface management becomes thus a constraint for network selection.

### *A. Handover decision:*

It refers to the process of deciding to which access network to connect at any point of time. This allows the best access network to be selected and handover to this access network to be initiated. In fact, based on the gathered information, the available interfaces, the user preferences and the black list, mobile terminal evaluates the neighboring access networks and select the most suitable one. Network selection is the heart of the handover procedure and a key decision enforcement of the terminal-controlled mobility management.

### *B. Handover execution:*

Handover follows access network selection. Once the selected access network differs from the serving one, the handover execution is performed. The main goal of handover execution is to preserve session continuity while changing the point of attachment. If the handover fails, the network selection will attempt to select another access network. This experience will be registered in the experience repository.

After identifying the appropriate handover instant, the next step of the process is the network selection decision-making. We specify a network selection that performs in two phases: pre-selection and utility-based decision-making. In the pre-selection phase, undesirable access networks will be eliminated from the candidate list. First, the elimination involves access technologies whose corresponding radio interface is turned-off according to the interface management policies. These access networks are discovered right before taking the decision to turn off their corresponding interface. Secondly, the ANIs belonging to the black list established in the experience repository are filtered out. The pre-selection phase can also eliminate access networks that do not support the services required by the user.

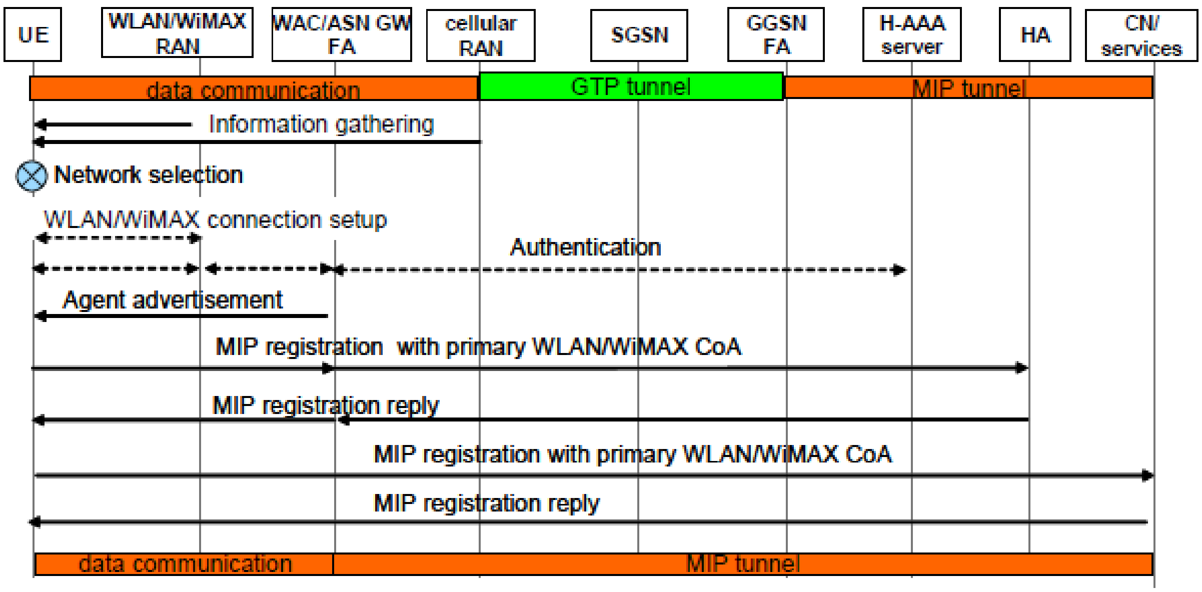


Fig 2 .Handover from 3GPP to WLAN/WiMax

*C. Handover example*

When the user equipment is communicating via 3GPP Radio Access Network (RAN) and the target access network, according to the network selection, is WLAN/WiMAX, the vertical handover from 3GPP to WLAN/WiMAX is triggered. First, the user eQuipment sets up the connection and authenticates with the target network. The foreign network authenticates the user equipment by exchanging the information with the H-AAA server. Afterwards, the UE acquires the corresponding care of address and sends a MIP registration with a primary WLAN/WiMA radio coverage types, in order to find available access networks. This function allows determining a generic set of parameters describing access networks and devices. Different type of elements that the terminal X care of address option to the home agent and its control node. Once the MIP registration reaches the HA and its CN, these latter set the new WLAN/WiMAX CoA as primary CoA, return the MIP registration reply and use the new CoA path to forward or send data to the UE. After the handover is complete, the cellular interface remains active for a period of time to receive the in-flight packets from the old path and finally switches to standby state.

## V. HANOVER EXECUTION

As the converged core network will be purely IP-based, we adopt the mobile information protocol(MIP) mechanism to maintain transparent network connectivity for mobile users on the move between different IP sub networks. In fact, when a user roams into a foreign network, its terminal will acquire a new temporary address, called care of address. This address can be either obtained via an auto-configuration mechanism or be the address of the foreign network gateway, known as foreign agent. The former is known as co-located care of address (CCA) and the latter is known as foreign agent address (FAA). To accommodate the user roaming within IPv6 networks, a terminal can configure itself a new care of address without requiring an foreign agent. The terminal then registers its care of address with its node and its home agent located in its home domain so that the packets destined for the user can be delivered to its current attached network.

## VI. MULTIPLE INTERFACE HANDOVER

The main idea of the multiple interface handover execution is that user equipment establishes a new connection with the target access network via its new target radio interface while maintaining the communication with its serving interface. The authentication with the target access network can be achieved through a universal pre-paid SIM card. After the handover is completed, the old interface remains active for a period of time to receive in-flight packets on the old data path, and finally switches to standby state. There exist two simultaneous communications via two different radio interfaces during a short handover execution period. One may note that another handover execution scheme like SIP-based handover n be used in place of MIP-based handover without affecting our proposed interface management and network selection solution. In any case, we only need to know the handover execution delay to determine the appropriate handover threshold to achieve seamless handovers and reduce power consumption

## VII. CONCLUSION

This paper has presented a end user controlled handoff method designed for roaming across various 4G networks. The proposed method can be used to combine different existing wireless technologies into common seamless roaming network. It uses a range of mutual information about different networks, users and services to execute user controlled handover procedure. As the user preferences are completely configured automatic user controlled handover can be initiated. It reduces user intervention in vertical handover and optimize resource usage.

## REFERENCES

[1] M. Methfessel, F.-M. Krause, and K. Helmrich, "Research report on power consumption," WINDECT project, Tech. Rep., Feb. 2005.

[2] T. Melia, D. Corujo, A. de la Oliva, A. Vidal, R. Aguiar, and I. Soto, "Impact of heterogeneous network controlled handovers on multi-mode mobile device design," in *Proc. of IEEE Wireless Communication and Networking Conference*, Hong Kong, March 2007.

[3] L. Murphy, J. Noonan, P. Perry, and J. Murphy, "An application-quality-based mobility management scheme," in *Proc. 9th IFIP/IEEE International Conference on Mobile and Wireless Communications Networks (MWCN 2007)*, Cork, Ireland, 2007.

[4] S. Frattasi, H. Fathi, F. Fitzek, R. Prasad, and M. Katz, "Defining 4G technology from the user's perspective," *Network, IEEE*, vol. 20, no. 1, pp. 35–41, 2006.

[8] M. Kassar, B. Kervella, and G. Pujolle. An overview of vertical handover decision strategies in heterogeneous wireless networks. Computer Communications, pages 2607–2620, 2008

[7] Hugin Expert A/S. Hugin. Website, 2009. http://www.hugin.com/.

-

**M.Gopu, M.E., (Ph.D)**, research scholar. Doing Ph.D in CMJ university, megalaya , India, under the guidance of Dr. Ritesh Khnna.