Context Aware Middleware Services for Disconnection Tolerant Mobile Applications

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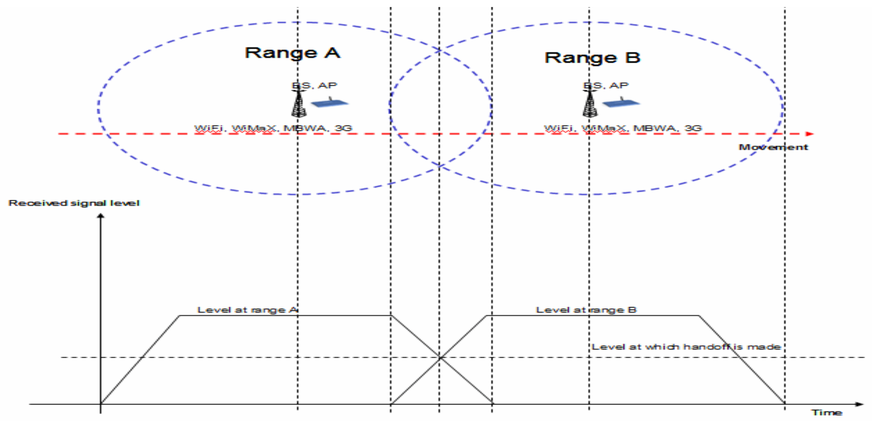
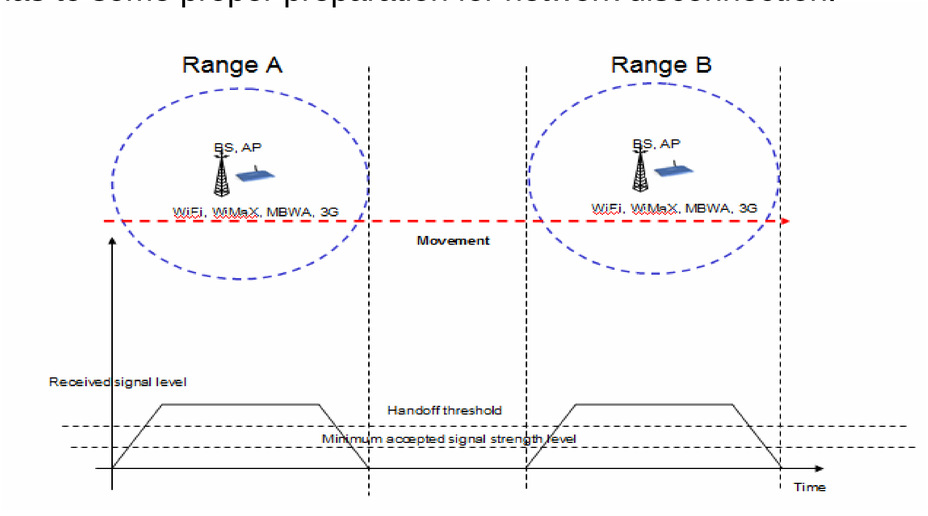
Introduction

To provide effective mobile services in spite of network disruption, context aware middleware services on mobile devices and application servers can provide services for continuation of applications, by managing mobile services, network connection, limited resources, and context information.
In this research, we propose context aware middleware services for disconnection tolerant mobile application services. Such middleware services manage runtime application and networking contexts for decision making of the middleware.

Research Problem



While the mobile device is moving from one network range A to another network range B, handoff is usually made at the point, which is an intersecting point between decreasing signal level at range A and increasing signal level at range B.
For our case, there is no available network while the mobile device is moving form one network range A to another network range B as shown in figure blow. When the signal level A reaches to handoff threshold as the device moves,
there has to some proper preparation for network disconnection.



Therefore, in order to make proper preparation for gradual network disconnection, we need two context aware decisions.
With regard to the first context aware decision,
we have to decide whether a device is getting out of coverage area and is going to be disconnected.
We apply incremental method with signal strength.
The decision only with signal strength is called simple decision.

Context Aware Decisions

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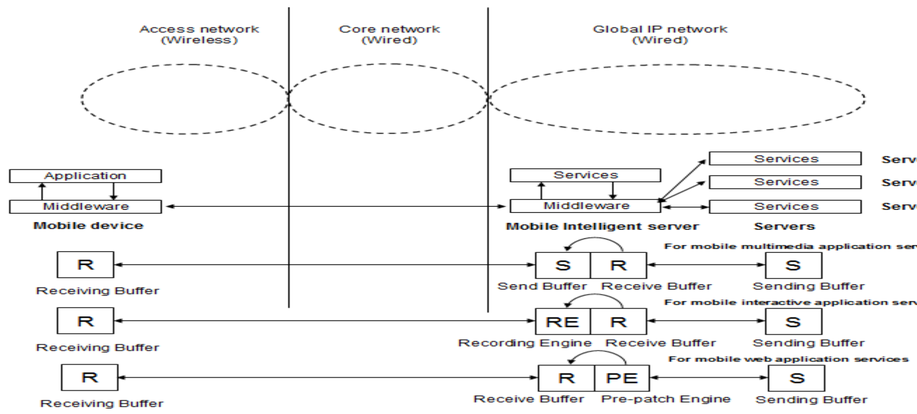
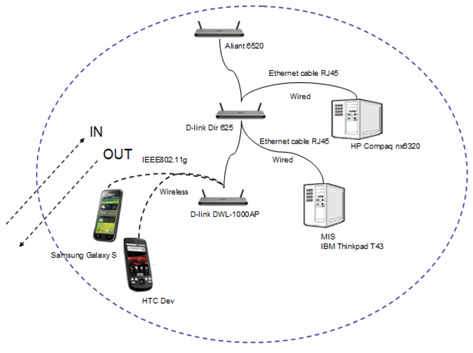
With regard to the second context aware decision on mobile application services, we have to decide when the device should start to make preparation for gradual network disconnection based on network type, application bit rate, device type, device speed, and signal strength.
The decision with above context information is called moderate decision.

General Solution Model



Experiment and Evaluation



For mobile multimedia application services, We analyze multimedia data (.mp4/11.3M) received without decision and with context aware decision in order to show how effectively and efficiently we could get data before network disconnection with higher sending rate.

For mobile interactive (ex. game) application service, we use public game sites.
The MIS obtains the information of current session for mobile device from application server and keeps this session during the network disconnection period. Therefore, after reconnection, the mobile device may resume the interactive service through the MIS.

For mobile interactive (ex. web) application service, the mobile device could obtain the first sub level contents of current web document before network disconnection so that the user may enjoy web services without undesirable termination during network disconnection period.

Reference

• **S. Cha**, W. Du, “Context Aware Middleware Services for Disconnection Tolerant Mobile Applications” in Proceeding of the 9th Communication Networks and Research Conference (CNSR 2011) IEEE, Ottawa,