A Critique of the Paper

"Composable Ad-hoc Services for Universal Interaction"

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The authors define "universal interaction" as meaning the capability of a mobile device to adapt itself to the network environment and allow the user to control the discovered services. In this context, they approach the task of allowing mobile devices connected to a wireless network to discover points of services in the immediate vicinity. Towards this goal, they describe solution to the following issues: device mobility, object controllability, resource discovery, protocol transduction (using an interface definition language that describes UI elements that control the objects), and object composition.

The infrastructure developed in the course of the research is highly targeted to services that need to provide localized control (the geographical map is almost built in into the network), and to clients that need to provide only a way to control the environment (e.g. "remote control"-type clients). Location-dependent services are one of the useful types of services that might be implemented on a network. This infrastructure does not prevent other types of services, but it definitely makes implementing them much harder and with added complexity.

Information-based services are one of the weak points of this "universal interaction" infrastructure: all the services implemented or planned in the paper are control-oriented, rather than data-oriented. It is unclear to me whether control-oriented services are a subset of data-oriented services or vice-versa (and it seems to be a chicken vs. egg problem). It is definitely possible to use the infrastructure provided to serve web-style, hyper-linked data, but, again, the design does not easily lend itself to such a task.

For a location-dependent service the network provides location information. There are some limitations not addressed in the

paper about the way location is determined and used. Because a hierarchical definition of locality is used (rooms are parts of a floor, floors are part of a building), location is restricted to one item only. For example, a device on the UCSB campus could be part of the *Santa Barbara County* group, and also part of the *California Beaches* group. I do not see how this is doable in the given infrastructure. On the other hand, most of the paper describes services that interact with "very local" objects, such as objects within reach of the user.

The issue of scalability is not addressed in the paper. Actually, the existence of more than one client is not addressed in the paper. It seems that scalability is not considered a problem, as only one host is planned/used for a location. This introduces one point of failure within that area. Fault detection and recovery are not discussed, although the architecture requires a high availability rate. There are not fall–backs, so a single *service interaction proxy* has to handle all the work, and all the errors.

Resource discovery is done using a modified implementation of the Service Location Protocol. Unfortunately, no details are provided, and locating services is restricted to within the current cell/area.

Two solutions to different problems are worth mentioning. For service location, they use a protocol that involves connecting to a default (INDEX) service that lists all the other services. The simplicity of the method keeps the computing power requirements low for the user device. Second, for controlling the network–accessible objects, a standard interface language is needed. Their solution is to use a minimal, data structure–based, IDL, and then to provide for the possibility to download code (in various languages) to the client device. This allows for different powered devices (in terms of computing power) to interact with the same network.