

Are “Infrastructures for Smart Devices” Needed?

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Position Paper

Workshop on Infrastructures for Smart Devices
HUC2k, Bristol, September 27th, 2000

While talking to people from the Ubiquitous Computing community, opinions about the need for a general infrastructure for devices, and more generally, services are quite different. Basically they range from statements such as "Infrastructures are nonsense!" to "Without proper infrastructures UbiComp will never become reality." Such controverse statements lead to our general thesis that we have not yet reached a common agreement in the community on what infrastructures are, and whether they are useful at all.

What is meant by the term “infrastructure” and what are the special requirements “smart devices” impose which an infrastructure has to meet? Is this “infrastructure” something like “Plug and Play”, an IP-protocol stack, or some middleware-system, like CORBA? What are the basic differences of “smart sevicees” in comparison with, e.g., traditional PCs? Are they a fundamental different set of appliances or is there an easy way to integrate them into current infrastructures? Is it the mere number of smart devices that makes it difficult to build ubiquitous systems? Why does it seem that there is no obvious answer to the question “What is an infrastructure” and “What is the right infrastructure”? Is there really something worth to research or is it all industry-driven?

Moreover, the term “ubiquitous” in “ubiquitous computing” implies that the not-further-named infrastructure has to be deployed everywhere and almost at the same time to make the “ubiquitous” part work. What is the business model for this huge investment? There are only few examples for widely-adopted infrastructures: Networks, IP (plus DNS), and GSM for mobile telephony. But these (successful) infrastructures are very “basic” infrastructures in comparison to high-level-infrastructures, like CORBA. Even the Web, i.e., HTTP, HTML, etc., is simple from an architectural point of view.

One major difference between the Internet and its infrastructure and some ubiquitous-computing-infrastructure (UCI) for Smart Devices is the time-scale: To make a deployment of a UCI successful it has to be deployed fast and, well, ubiquitous. The Internet, on the other hand, grew slowly over a quite long period of time. Only as the overall complexity was large enough, it gained commercial interest. For UCIs it has to be the other way around: There has to be a vendor-independent common commercial interest in standardizing, realizing, and deploying such an UCI to make ubiquity an actuality.

This lack of common sense motivates our aim for a suitable characterization of the notion of infrastructures. Some questions to be discussed are:

- Is infrastructure like oxygen: Anytime, anywhere, on any device?
- Does infrastructure deal with hardware artifacts?
- Does infrastructure connect things?
- Does infrastructure facilitate and standardize information exchange?
- Are infrastructures a potential hook to implement security features?
- Who adapts? The infrastructure to a device/service or vice versa?

We are looking forward for interesting discussions in Bristol.