

Demonstration of the DYAMAND Framework

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Abstract—This demo proposal aims to show the benefits of the DYAMAND (DYnamic, Adaptive Management of Networks and Devices) framework as presented in [1]. The DYAMAND framework offers a middleware solution to the problem of device interoperability. In this demonstration, we will show that completely different systems can be combined by using the DYAMAND framework to offer new (combined) functionality. We will not only do this by combining different service discovery protocols, but would like to demonstrate that the installation of different services can be done dynamically and without prior knowledge.

I. DEMONSTRATION SCOPE

Although consumer devices are becoming increasingly smart, the full potential cannot be used because of several interoperability issues as discussed in [1]. Six different such issues are identified:

- 1) different device/service models,
- 2) different service type representations,
- 3) different remote control protocols,
- 4) different service type semantics,
- 5) different eventing protocols,
- 6) different event semantics.

The framework that is presented in [1], DYAMAND, solves every identified issue without noticeable delay. In this demonstration, we will illustrate the benefits of the DYAMAND framework by using different systems using completely different service discovery protocols to gradually build a more complete, interoperable system of systems. This shows the significance and possibilities of the DYAMAND framework. Furthermore, we want to demonstrate that this integration of systems does not require technical expertise apart from the installation instructions of the separate systems.

II. DEMONSTRATION SETUP

The demonstration setup consists of a simulated office environment that includes a laptop, a monitor and a light. Furthermore, four smart plugs (using Zigbee) are used to measure and control the power usage of aforementioned devices. Additionally, a number of sensors will be used to detect changes in the environment: a motion/temperature sensor and a door/window contact using Z-Wave, and - to demonstrate cross-technology interoperability - a temperature sensor and a door/window contact using EnOcean. Furthermore, a device running the DYAMAND framework (together with USB dongles for the different supported protocols), a smart phone (using UPnP to announce itself) and a wireless router providing connectivity

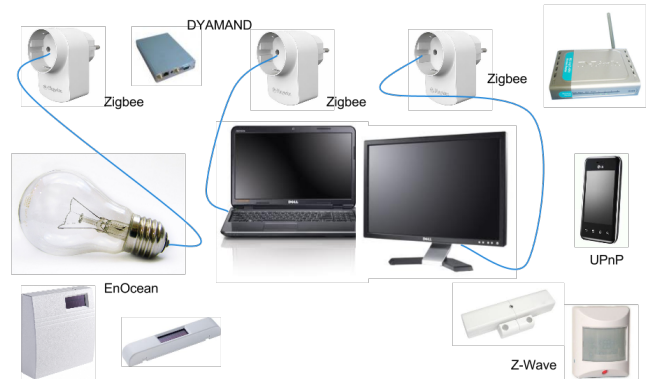


Fig. 1. Demonstration setup

are involved. Fig. 1 shows all the equipment that is needed for this demonstration. One table should be enough for this setup, preferably together with the poster that is being presented for the paper *DYAMAND: DYnamic, Adaptive Management of Networks and Devices*. Setup time is more or less half an hour. Additionally, we need access to a power supply, we will supply the necessary extension cords.

III. DEMONSTRATION SCENARIO

Two basic concepts will be demonstrated: interoperability between different devices and the installation of combined services. Therefore, the following scenario will be presented (can vary according to local circumstances):

- 1) Show a basic DYAMAND application without any discovered devices;
- 2) Install smart plugs: show basic usage of smart plugs;
- 3) Install an application that uses smart plugs for simple use case (e.g. switch off monitor if laptop is unplugged);
- 4) Install presence detection application and configure it to use discovery of UPnP service on smart phone as simple presence indicator;
- 5) Install an application that uses presence detection to switch off all smart plugs;
- 6) Install EnOcean plugin enabling support for the EnOcean door/window contact and temperature sensor;
- 7) Configure the presence detection detection to use door/window contact;

- 8) Install Z-Wave plugin enabling support for the Z-Wave door/window contact and temperature/motion sensor
- 9) Show presence detection application reacts on Z-Wave door/window contact without any configuration
- 10) Show final use case.
 - a) User enters building (detected by presence UPnP service on smart phone): smart plugs are switched on
 - b) User enters office: door/window contact triggers office light
 - c) User plugs in laptop: monitor switches on
 - d) User leaves for meeting with laptop: monitor switches off
 - e) Motion sensor indicates no motion occurred in recent past: lights switch off
 - f) User leaves building: smart plugs are switched off

REFERENCES

- [1] J. Nelis, T. Verschueren, D. Verslype, and C. Develder, "DYAMAND: DYnamic, adaptive MAnagement of networks and devices," in *37th Annual IEEE Conference on Local Computer Networks (LCN 2012)*, Clearwater, Florida, USA, Oct. 2012.