mobile VCE : research innovation application :

UPnP:
Breaking out of the LAN

Industry brief

Strategic Business Relevance:

The widespread take up of smart mobile devices, be they phones or tablets, gives a new opportunity for service providers to connect with consumers on the move. Zero-Configuration discovery technologies like UPnP enable devices to discover other mobile devices in the environment without requiring users to negotiate complex configuration issues before using such devices.

Providing Services on the Move

More people are becoming accustomed to using mobile devices to access other devices embedded in their environment supported by technologies like contactless payment using near field communications (NFC), and embedded information in 2D barcodes.

Such pervasive environments give service providers a new way to connect with consumers on the move, assuming those consumers can discover devices in the environment that provide these new services.

What are the Challenges?

Existing device discovery technologies, although widely used in local networking, are not designed to scale to large networks that may be necessary to enable device discovery in these environments.

Providing secure methods of communication between such devices is necessary to keep consumers data safe and reassure them of any privacy concerns.

Enabling consumers to have access to their devices at home and in the workplace while they travel, would give them access to familiar tools and data they may not know they needed before they set off.

Core Research: User Interactions for Breakthrough Services

This research addresses the ways in which users interact with portable and mobile devices (and other devices in their physical and logical environment) in order to enable new types of personalised and highly contextualised services.

This part of the programme – Simplifying Service Awareness & Transparency - aims to provide tools that engage the consumer, better capture his needs, and enable him to discover services that meet those needs in an intuitive way.

Virtual Centre of Excellence in mobile and personal communications

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Research and Development to Date

Our research to date has involved building a proof of concept architecture to address the three challenges above: scalability, security and availability.

Architecture

We introduce a client/server architecture using a single server (Dispatcher) that services a number of clients (Bridges). Each Bridge includes a modified UPnP Control Point that provides access to UPnP devices on the local networks.

Bridges communicate with the Dispatcher using an outgoing, secure connection. This gives us the security we require, and avoids many problems with local network firewalls.

Each Bridge communicates those devices available locally to the Dispatcher that can then share those devices to other Bridges as required. Such Bridges can then create a Mock Device that effectively makes a device available on a remote network.

For example, Figure 1 shows device A at Bridge 1 being made available as a Mock Device (a) on Bridge 2, while Device C on Bridge 2 is made available as a Mock Device (c) on Bridge 1. We do not need to share devices that we don't want to: device B is not shared remotely.

Scalability

Many of the problems of scalability are down to the protocols involved in UPnP itself and this architecture avoids using those protocols when sharing devices, thus solving many of the scalability problems.

In theory this solution can also be applied to other device discovery technologies. The Dispatcher itself knows nothing of UPnP, it is just providing communications between Bridges that do. To extend the architecture to a second discovery technology (e.g. Bonjour), the Bridges would need to understand that technology and convert protocol specific messages into the higher level abstracts we use in our architecture.

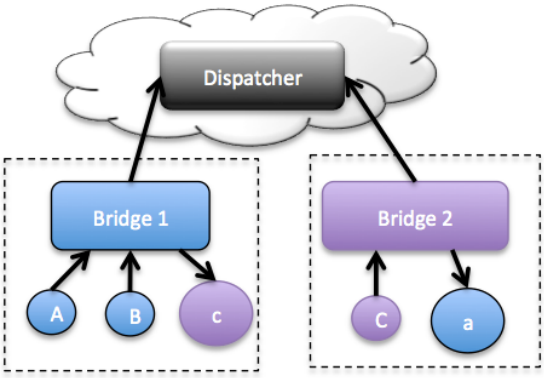

Figure 1

Key Points

- Non-technical consumers do not wish to negotiate complex configuration issues before they can use devices that provide services to them on the move. Zero-configuration technologies like UPnP invalidate the need to do so.
- Existing discovery technologies are largely incompatible and local network bound. Our Architcture breaks out of the LAN and provides the ability to scale to large networks. Furthermore it will extend to multiple discovery technologies.
- This technology provides inter-network security, providing the Dispatcher itself is secured. Consumers can not see devices on Bridges to which they have no access, data between networks is not vulnerable to interception or modification.

Industry focused research, innovation & application