

UPnP connectivity between home networks

Rafiqul Hasan Chowdhury
Helsinki University of Technology
P.O. Box 5400, FIN-02015 TKK, Finland
rafiqul.chowdhury@tml.hut.fi

Abstract

A home network can be defined as an interconnection of two or more computers in the home to share files or Internet access. Different types of devices such as personal computers, cameras, televisions, home security systems etc. are increasingly connecting to home networks. Different devices use different types of connection methods. Home networking should be self configuring network that will allow devices to join and leave networks automatically and will allow devices to learn about other connected devices. In a typical home network, people may have devices for several purposes. One device may be used for media server; another device may be used for storing personal photo contents etc. People can view pictures, play music and watch video in the living room where contents come from the computer located in another room.

Universal Plug and Play (UPnP) is architecture for peer-to-peer network connectivity of different types of devices such as personal computers, wireless devices, handheld computers etc. UPnP is designed to provide easy, flexible connectivity of the devices in the home or in the business network. UPnP devices use multicast to announce their presence or absence. When a device joins in a Local Area Network (LAN), it announces its presence through multicast and all other UPnP capable devices can listen to this multicast and find the available services in that device. Similarly, when a device leaves a LAN, it sends a bye message to inform other devices that it is no longer available. UPnP protocol is suitable in home networking where people buy a new device, plug it to the network and then the device handle itself all the necessary things in order to access the resources of the network.

Home networking and Internet connectivity in the domestic environment are growing rapidly. With the increasing Internet connectivity in households, people are now more interested to listen music contents of his home at a holiday home without carrying the content to holiday home or to show holiday pictures at a friend's house without carrying the pictures. These requirements of the user can be fulfilled if the services of his home network can be made available to the friend's network or holiday home network.

A limitation of UPnP is that the scope of the protocol is limited to one LAN only. Announcement of the UPnP protocol does not go beyond one LAN as routers do not allow multicast packets to be forwarded from one LAN to another. As a result UPnP devices and services of one home network will not be available to another home network. We concentrate on the issue of connecting multiple UPnP home networks without sending the multicast packet from one home networks to another home network. We also consider NAT (Network Address Translation) as it is likely that home networks use the private IP addresses.