URcast Installation

This guide is designed to help you understand how to install URcast in your school. It assumes that you have a basic understanding of how the URcast system works. You will have to make a few planning decisions before you being the installation

URcast System Overview

URcast is a system for delivering multimedia educational content to students' devices. Teachers publish content as messages to a URcast Server.   Students subscribe to receive those messages on their device. Whenever a student launches the Message Center app on their device from within the school, the program will automatically download all of the messages in each subscribed class to the device. This enables teacher-directed, any-time / anywhere learning.

Planning a URcast Network Installation

The first step in planning your URcast installation is to decide what hardware / network structure you intend to use. The choices are summarized in the URcast document "URcast Network Options" including some network diagrams and brief discussion point to help you decide. The fundamental decisions come down to how many URcast Servers and Gateways you want to use and where to locate them.

Factors that might influence your decision process include:
  – How many students you need to support: a single low-end computer acting as a Gateway can supply content to 80-100 student devices, but fewer is usually better
  – How much content you intend to deliver: more content is more storage and more network load and more benefit from locating URcast equipment close to the student devices
  – How much LAN bandwidth you have: if you have 802.11g Wi-Fi instead of 802.11n then your wireless may not be fast enough to fully utilize more than 5 Gateways
  – How much WAN bandwidth you have: if you have a relatively slow WAN link you may not be able to locate your Server(s) in the Central Office so they must go in your schools

Frequently however, these choices will be driven by staffing, physical security, IT policy, or other considerations instead of technical ones. Some judgements based on experience are usually required.

Common Installation Patterns

There are so many ways to install URcast that it's easiest to follow one of the more common installation patterns. Here are a few of the most common.

Typical Installation

Typical in-school installations have a single Server with 4-8 Gateways to distribute the network load.   The Server should support 75 educators publishing. Each Gateway would support 80-100 students with typical load.

Minimal Installation

A minimal evaluation install is a single piece of hardware with both a Server and a Gateway running on it. This install will support up to 80 students with typical load.

Hosted Installation

A hosted installation would place the Server in the Central Office or a hosting provider (such as Microsoft Azure). A school would have a master Gateway to replicate content from the Server and provide that content to 4-8 Gateways to distribute. Each Gateway would support 80-100 students with typical load.

Device Requirements

Make sure you check the "URcast Device Requirements" document when you select your hardware. Currently, URcast Servers and Gateways must run Windows 7 / 8 / 10 / 2008 Server / 2012 Server.

URcast Servers and Gateways alike require the following additional software installed:
1) .NET Framework 4.0 or higher - **Full version**. This patches IIS so if you install IIS first you must run a windows 'repair' install on the framework to configure IIS correctly.

2) The following Windows Features must be turned on:

- **For Windows 7**

    1) Internet Information Services
       - Web Management Tools
         1. IIS Management Console

       - World Wide Web Services
         1. Application Development Features
            - ASP
            - ASP.NET

         2. Common HTTP Features
            - Default Document
            - Static Content

         3. Health and Diagnostics
            - HTTP Logging

         4. Security
            - Basic Authentication

    2) Internet Information Services Hostable Web Core

    3) Microsoft .NET Framework 3.5.1

- **For Windows 8**

  1) .NET Framework 3.5 (includes .NET 2.0 and 3.0)

  2) Internet Information Services
     - Web Management Tools
       1. IIS Management Console

     - World Wide Web Services
       1. Application Development Features
          - ASP
          - ASP.NET 3.5
          - ASP.NET 4.5

       5. Common HTTP Features
          - Default Document
          - Static Content

       6. Health and Diagnostics
          - HTTP Logging

       7. Security
          - Basic Authentication

  3) Internet Information Services Hostable Web Core

- **For Windows 10**

  1) .NET Framework 3.5 (includes .NET 2.0 and 3.0)

  2) Internet Information Services
     - Web Management Tools
       1. IIS Management Console

     - World Wide Web Services
       1. Application Development Features
          - ASP
          - ASP.NET 3.5
          - ASP.NET 4.6

       8. Common HTTP Features
          - Default Document
          - Static Content

       9. Health and Diagnostics
          - HTTP Logging

       10. Security
          - Basic Authentication
          - Request Filtering

  3) Internet Information Services Hostable Web Core

- **For Windows Server 2008**

    1) .NET Framework 3.5.1 Features

    2) Add Server Role: Web Server (IIS)

        - Web Server
            1. Common HTTP Features
                - Default Document
                - Static Content

            2. Application Development
                - ASP.NET
                - .NET Extensibility
                - ASP

            3. Health and Diagnostics
                - HTTP Logging

            4. Security
                - Basic Authentication

        - Web Management Tools
            1. IIS Management Console

        - IIS Hostable Web Core

- **For Windows Server 2012**

    1) Add Server Role: Application Server

        - .NET Framework 4.5

    2) Add Server Role: Web Server (IIS)

        - Web Server
            1. Common HTTP Features
                - Default Document
                - Static Content

            2. Health and Diagnostics
                - HTTP Logging

            3. Security
                - Basic Authentication

            4. Application Development
                - .NET Extensibility 3.5
                - .NET extensibility 4.5
                - ASP
                - ASP.NET 3.5
                - ASP.NET 4.5

        - Management Tools
            1. IIS Management Console

The installation kits themselves will configure other IIS parameters, add web sites, add MIME types, open firewall ports, and install windows services to complete the configuration.

URcast Installation Programs

URcast comes with the following installation programs:
- **setupURcastServer.msi** – installs the main Server program and a master Gateway for feeding other Gateways, plus a copy of the support / maintenance applications
- **setupURcastGateway.msi** - installs just a Gateway and the support / maintenance applications (not needed when the setupURcastServer.msi has already been installed)
- **setupURcastApps.msi** - installs just the support / maintenance applications, usually used on a technician's desktop (not needed when the setupURcastServer.msi has already been installed)
- **MsgBuilderX86.msi** - installs the Message Builder application for educators to create lessons
- **StudentMessageCenterSetupX86.msi** - installs the Student Message Center for Windows so students can receive lessons
- **Student Message Center for iOS** – can be installed from Apple's App Store
- **Student Message Center for Android** – can be installed from the Play Store
- **Student Message Center for Chrome** – can be installed from the Chrome Web Store

After running the proper installer(s), you may still have some network configuration to do so that the various components can talk to each other.

Network Configuration

One of the biggest decisions to make in the planning stage is deciding how your URcast devices will 'discover' each other so that they can communicate. Servers, Gateways, and student devices all need to know the name or address of some other Server or Gateway they must connect to. You can configure these addresses explicitly: all versions of Message Center support entering the name / address of a Gateway to use in downloading content. Similarly every Gateway has a configuration file where you can specify a network name / address for the Server that will provide its content. This can turn out to be a lot of configuration and configuration that would have to change when things change on your network so we created the URcast Announcement facility.

URcast Announcements

The URcast Announcement facility lets Gateways and Servers announce their service role, network address, and client load to the network. Other devices may listen for these announcements and discover the machine they need to connect to based on its declared Role. For instance student devices will find Gateways on the network and choose one to use for downloads. This technique is useful because it allows a flexible, low-maintenance way of enabling these connections without the need to make changes to large numbers of configuration files.

URcast Announcements can be in a couple of different ways: UDP Broadcast or TCP Multicast. The URcast Servers and Gateways support configuration files that may be used to specify either the address or the Announcement Role of the other nodes they connect to. The choices for student devices are:

- Broadcast: A Gateway will use UDP broadcasts to announce "I'm a URcast Gateway with content and only X users". The Message Center client listens to discover them automatically and picks the least-loaded one. This only works within network subnets.
- Multicasts: A Gateway uses TCP Multicast to announce just as above. Message Center listens on TCP multicast port for announcements and selects a Gateway. This requires routers that support TCP Multicast.
- Fixed: user enters the network name or IP address of the gateway into their Message Center app. But there is no automatic Gateway load leveling or fail-over support.
- Server: The Message Center app can contact a specific Server by address and get the list of Gateways seen by the Server via Broadcast and Multicast. The Message Center app will select the least loaded.

Miscellaneous

URcast devices install by default to use announcements. You can certainly configure the network addresses in your system explicitly. You will need to configure your Gateways with the Server address, and each of your clients with a Gateway address. But this configuration will not automatically load-level your network usage and if a specified machine fails, other devices won't automatically switch over to use an equivalent device.

If you want to use broadcast or multicast discovery and are using a 'typical installation' then you won't have network configuration to do after the install. Your Server will announce as a 'Server' and as a 'MasterGateway'. Your Gateways will find the 'MasterGateway' to retrieve their content and then announce themselves as 'Gateway' devices. Your student devices will find 'Gateways' and download content from them.

You can configure Gateway features by modifying the GatewayService.exe.config file in your c:\Datacasting\Applications\ directory and then restarting the 'URcast Gateway' Windows Service. The most common change would be if you wanted to point a Gateway to a Server by name or address. You could create a hierarchy of Gateways delivering to Gateways by structuring the 'AnnouncementRole' and 'ParentAnnouncementRole' values in the configuration file just right, but be careful because errors in the configuration files are hard to debug and they stop the service on startup.

If you need to change the Server configuration it is handled similarly in the DatacastingServices.exe.config file. Usually you don't need to change the announced roles for a URcast Server but there may be other parameters that need changing. You will have to restart the URcast Master Service for changes to take effect.