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ESRI Systems Integration Technical Brief

Identifying Firewall TCP Server Ports In a Enterprise ArcIMS Configuration

Technical Brief
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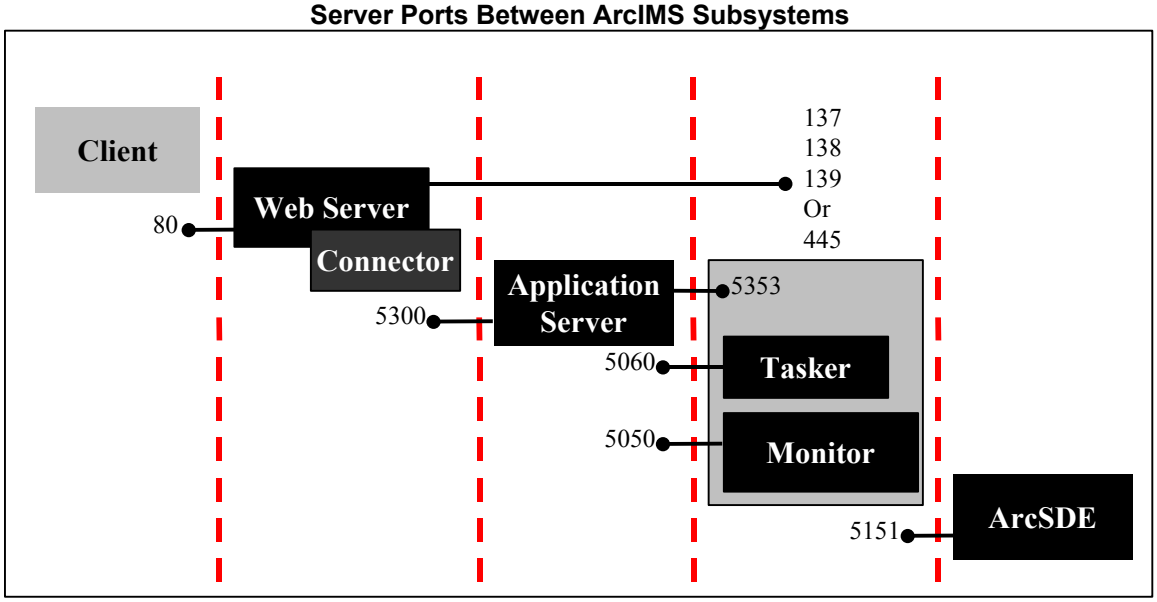
Introduction

The purpose of this technical brief is to identify the firewall server ports used between the various ArcIMS subsystems (Web Server, Application Server, Monitor and Tasker). This brief will also look at the technical challenge of maintaining TCP persistent connections within ArcIMS. This information is critical when designing for enterprise environments, which typically distributes the ArcIMS subsystems across several different servers.

ArcIMS Subsystem Server Port Descriptions

This conceptual diagram shows server ports associated with each ArcIMS subsystem. The "lollypop" symbol identifies the specific listener port associated with each individual ArcIMS Subsystem. The dashed line indicates a firewall, which is to help identify the individual server ports that would need to be open to maintain communication.

Figure 1
Server Ports Between ArcIMS Subsystems



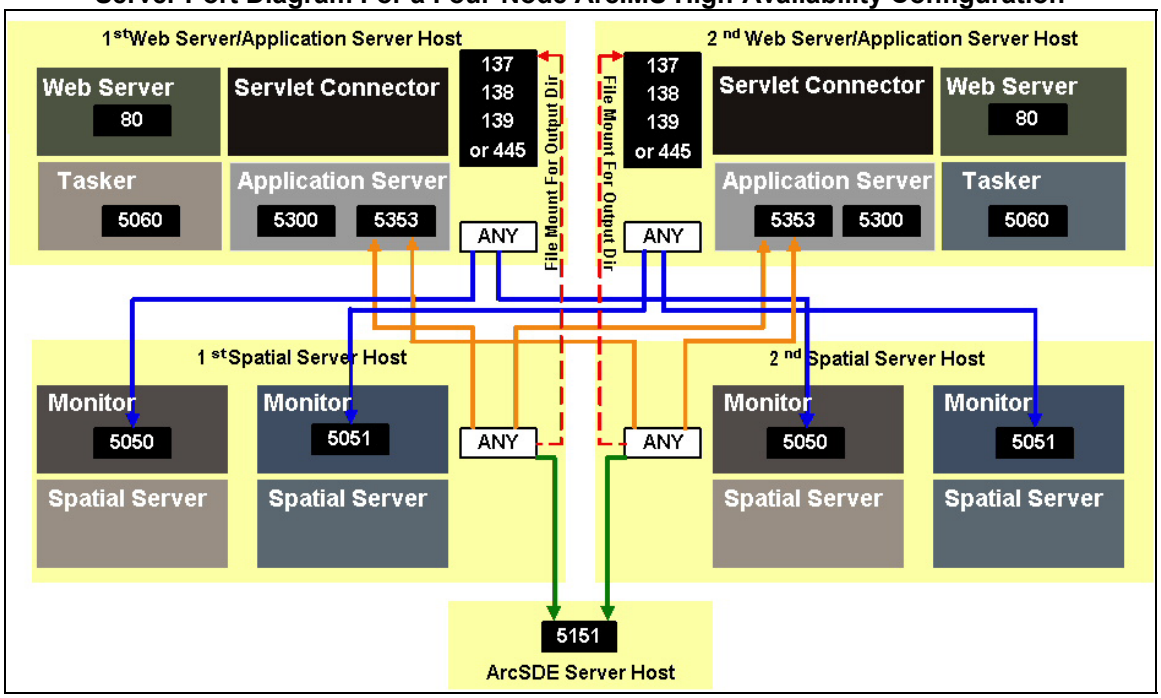
- Web Server: Allow incoming connections to listener port 80 for web clients. Also allow incoming connections to listener ports 137, 138 and 139 from any port on spatial server machine. Ports 137, 138 and 139 are needed for the Server Message Block (SMB) protocol, which is used for file sharing in a Windows NT / 2000 environment. SMB is needed to write the output image files from the Spatial Server to the Web Server. With Windows NT, SMB ran on top of NetBIOS for TCP (NBT), which uses ports 137, 138 and 139. Windows 2000 has the ability to run SMB directly over TCP with port 445. To use port 445, NBT must be disabled.

- Application Server: Allow incoming connections to listener port 5300 from any port on web server machine.
- Application Server: Allow incoming connections to listener port 5353 from any port on spatial server machine.
- Monitor Service: Allow incoming connections to listener port 5050 from any port on application server machine.
- Tasker Service: Allow incoming connections to listener port 5060 from any port on application server machine. Application Server and Tasker Services are typically on the same host. When the ArcIMS subsystems communicate on the same host, the TCP connections will be routed internally through the loopback adaptor and are of no concern to the firewall administrator.
- ArcSDE: Allow incoming connections to listener port 5151 from any port on spatial server machine.

ArcIMS High-Availability TCP Port Diagram

There are several design alternatives when architecting an ArcIMS site. The diagram below shows the outgoing and incoming server port traffic in a typical four-node ArcIMS High-Availability Configuration. All the outgoing TCP connections on a ArcIMS component are consolidated onto a single "any" port. Listening ports are illustrated with black boxes and white numbers.

Figure 2
Server Port Diagram For a Four-Node ArcIMS High-Availability Configuration



Technical Considerations

There are additional considerations associated with placing firewalls between ArcIMS system components. These considerations include the need to maintain persistent, idle TCP connections if the ArcIMS map services are not accessed for an extended period. In addition to packet filtering rules, most firewalls are automatically configured to sever idle TCP connections after a specified timeout value is reached, and some may allow only limited administrative control of this timeout value - consult the firewall's documentation for details. TCPKEEPALIVE settings will not address these TCP connection issues adequately. Based on the experience of ESRI's Support teams, the likelihood of a firewall causing difficulties for ArcIMS depends on the TCP connection administration rules that the firewall employs, the firewall placement, and the length of time that the ArcIMS services might go unused. The following is a very general listing of the likelihood of idle connection termination by a firewall causing problems with the ArcIMS configuration:

High Risk
Between ArcIMS Spatial Server and ArcSDE
Low Risk
Between Web Server and ArcIMS Application Server
Low Risk
Between ArcIMS Application Server and ArcIMS Spatial Server

Increasing the firewall's internal timeout value could produce undesired results within the network. Possible repercussions include degraded firewall performance and additional security risks. If it is determined that the costs of increasing the firewall timeout values outweigh the benefits, an alternative would be to incorporate a "keep-alive" routine within an application that sends requests to all ArcIMS map services and public virtual servers at an interval less than the TCP connection timeout value of the firewall. Such a routine will keep all necessary TCP connections open without the need to change the firewall settings.

Conclusion

When implementing a firewall into an enterprise ArcIMS design there are several server ports that need to be identified to insure communication between the various subsystems. The distribution of the ArcIMS subsystems and placement of firewall will determine which specific server ports will need to be open.

In addition, maintaining persistent connections between the ArcIMS subsystems needs to be considered, since many firewalls often terminate idle connections. To overcome this, the firewalls internal timeout value could be extended or a TCP "keep-alive" routine could be implemented. In any case in which a firewall is to be employed, a complete understanding of the TCP/IP communication needs for ArcIMS/ArcSDE and the administration capabilities of the firewall device and/or software is required.

Support

Enterprise GIS system design is addressed in the *System Design Strategies* white paper at http://www.esri.com/library/whitepapers/pdfs/sysdesig.pdf. For answers to additional GIS capacity planning and solution questions, contact ESRI Systems Integration at sihelp@esri.com. For technical support, contact ESRI Technical Support at http://support.esri.com.

A test report for the Four-Node ArcIMS 4.0.1 Configuration using Network Load Balancing can be obtained at http://www.esri.com/systemsint/kbase/testrep.html.