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The Multicast Application Port
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Abstract

This document discusses the drawbacks of the current practice of assigning a UDP port to each multicast application. Such assignments are redundant because the multicast address already uniquely identifies the data. The document proposes assigning a UDP port specifically for use with multicast applications and lists requirements for using this port. This method does not require modification to existing protocol stacks, though recommended updates to make the port easier to use are included.

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1. Introduction

The Internet community has recognized the need to be judicious when assigning port numbers (see [RFC7605], Section 6). With unicast applications, the need for explicit port assignment has been reduced by techniques such as locally assigning a dynamic port, combined with some mechanism for advertising that port (see [RFC7605], Section 7.1). Dynamic assignment does not work with multicast applications because it is impossible to guarantee that the port remains unused by all hosts that may want to join a given multicast group. The result is that each multicast application-layer protocol has had to have its own dedicated port assignment. Even worse, each different use of that multicast application-layer protocol has had to have a different unique port assigned.

In the TCP/IP model, the port number in the transport layer multiplexes applications within a host (see [RFC1122], Section 4.1.1 and [RFC7605], Section 5). With Any-Source Multicast, the use of a port number to multiplex applications is unnecessary because the destination multicast address already provides a unique identifier for the application. The same applies to Source-Specific Multicast if both source address and destination multicast address are considered.

Because of the desire to conserve port numbers and the fact that a port is not necessary to multiplex multicast applications, this document assigns a UDP port that may be used with multicast applications: the Multicast Application Port.

Assigning a UDP port for multicast applications (as opposed to other methods) provides immediate compatibility with existing network protocol stacks. Section 3 contains requirements that facilitate use of the port on a given platform, but incorporating these requirements into existing platforms is expected to be a gradual process.

Use of this port is optional because there may be circumstances where assigning a port is preferred, such as when participants cannot meet the requirements in Section 3 and Section 4.

An application may use this port in conjunction with a unicast port to balance out deficiencies related to multicast distribution (see [RFC9119], for example).

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

2. Assignment

This document _requests_ assignment of UDP port 8738 (0x2222) and gives it the service name "mcast-app-port".

The _requested_ port may be used as a source port if the application exclusively uses multicast messages.

If any application messages are unicast, then a different port should be used for the source port. This allows receivers to know which port to send replies to. Such arrangements would likely require multiple sockets, as the application would need to bind to multiple ports.

3. Host Requirements

Hosts SHALL require applications using this port to use it non-exclusively. In practice, this means hosts using POSIX-like socket APIs would require applications to set the SO_REUSEADDR and/or SO_REUSEPORT socket options before binding the socket [POSIX]. This ensures that applications developed on a conformant host will also work on a non-conformant host.

Hosts SHALL prevent use of the port with the wildcard address (see [RFC3493], Section 3.8) by having the socket bind operation return an error code.

Hosts SHALL prevent applications from sending non-multicast packets to this destination port by having the send operation return an error code.

Hosts SHALL discard all incoming, non-multicast packets that use this destination port.

4. Application Requirements

Applications running on non-conformant hosts can ensure compatibility with conformant hosts by meeting the requirements in this section.

Applications running on a non-conformant host SHALL NOT prevent other applications from using this port. In practice, this means that applications using POSIX-like socket APIs would enable the SO_REUSEADDR and/or SO_REUSEPORT socket options before binding the socket [POSIX].

Applications running on a non-conformant host SHALL discard all datagrams that do not have the multicast address used by the application.

5. Security Considerations

Applications running on non-conformant hosts are vulnerable to a denial of service attack if another application claims exclusive access to the port.

Systems that use POSIX-like socket APIs typically have restrictions on binding multiple sockets to the same port. This can serve as a rudimentary security mechanism in that other local applications cannot eavesdrop on the multicast stream. A necessary side-effect of using the Multicast Application Port is that applications can no longer rely on these security mechanisms. These applications may want to incorporate additional security measures into their protocol.

Note that the problem of local eavesdropping is typically no worse than eavesdropping in-flight, so it is likely that both attack vectors can be resolved by the same security measure.

6. IANA Considerations

IANA is _requested_ to assign the following port:

Service Name	mcast-app-port
Transport Protocol	UDP
Assignee	IESG <iesg@ietf.org>
Contact	IETF Chair <chair@ietf.org>
Description	Multicast Application Port
Reference	This document
Port Number	8738

IANA is requested to update its "Application for Service Names and User Port Numbers" [IANA-APP] to reference this document, ask if the Multicast Application Port may be used, and require an explanation if not. This document does not prohibit future port assignments for multicast applications; the review team still has discretion to approve requests on a case-by-case basis.

7. Acknowledgement

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* Lorenzo Colitti for his suggestions for host requirements

* David Schinazi for pointing out likely port conflicts with several major OSes

* Dave Thaler and Juliusz Chroboczek for suggestions on the source port used for unicast

8. References

8.1. Normative References

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8.2. Informative References

[IANA-APP] Internet Assigned Numbers Authority, "Application for Service Names and User Port Numbers", <https://www.iana.org/form/ports-services>.

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