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Internet Assigned Numbers Authority (IANA) Procedures for the Management of the Transport Protocol Port Number and Service Name Registry
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Abstract

This document defines the procedures that the Internet Assigned Numbers Authority (IANA) uses when handling registration and other requests related to the transport protocol port number and service name registry. It also discusses the rationale and principles behind these procedures and how they facilitate the long-term sustainability of the registry.
This document updates RFC2780 by obsoleting Sections 8 and 9.1 of that RFC, it updates the IANA allocation procedures for DCCP as defined in RFC4340, and it updates RFC2782 to clarify what a service name is and how it is registered.

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1. Introduction

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For many years, the allocation and registration of new port number values and service names for use with the Transmission Control Protocol (TCP) [RFC0793] (Postel, J., “Transmission Control Protocol,” September 1981.) and the User Datagram Protocol (UDP) [RFC0768] (Postel, J., “User Datagram Protocol,” August 1980.) have had less than clear guidelines. New transport protocols have been added - the Stream Control Transmission Protocol (SCTP) [RFC4960] (Stewart, R., “Stream Control Transmission Protocol,” September 2007.) and the Datagram Congestion Control Protocol (DCCP) [RFC4342] (Floyd, S., Kohler, E., and J. Padhye, “Profile for Datagram Congestion Control Protocol (DCCP) Congestion Control ID 3: TCP-Friendly Rate Control (TFRC),” March 2006.) - and new mechanisms have been developed (DNS SRV records [RFC2782] (Gulbrandsen, A., Vixie, P., and L. Esibov, “A DNS RR for specifying the location of services (DNS SRV),” February 2000.)), each with separate registries and separate guidelines. The community recognized the need for additional procedures beyond just assignment; notably modification, revocation, and release.

A key factor of this procedural streamlining is to establish identical registration procedures for all IETF transport protocols. This document brings the IANA procedures for TCP and UDP in line with those already for SCTP and DCCP, resulting in a single process that requesters and IANA follow for all requests for all transport protocols, including those not yet defined.

In addition to detailing the IANA procedures for the initial assignment of port numbers and service names, this document also specifies post-assignment procedures that until now have been handled in an ad hoc manner. These include procedures to de-register a port number that is no longer in use, to re-use a port number allocated for one application that is no longer in use for another application, and procedure by which IANA can unilaterally revoke a prior port number registration.

Section 8 (IANA Procedures for Managing the Port Number and Service

Name Registry) discusses the specifics of these procedures and processes that requesters and IANA follow for all requests for all current and future transport protocols.

It is important to note that ownership of registered port numbers and service names remains with IANA. For protocols developed by IETF working groups, IANA now also offers a method for the "early" assignment of port numbers and service names [RFC4020] (Kompella, K. and A. Zinin, “Early IANA Allocation of Standards Track Code Points,” February 2005.), as described in Section 8.1 (Port Number and Service Name Registration).

This document updates IANA's allocation guidelines [RFC2780] (Bradner, S. and V. Paxson, “IANA Allocation Guidelines For Values In the Internet Protocol and Related Headers,” March 2000.) for UDP and TCP port numbers by obsoleting Sections 8 and 9.1 of [RFC2780] (Bradner, S. and V. Paxson, “IANA Allocation Guidelines For Values In the Internet Protocol and Related Headers,” March 2000.). (Note that different sections of [RFC2780] (Bradner, S. and V. Paxson, “IANA Allocation Guidelines For Values In the Internet Protocol and Related Headers,” March 2000.) were updated in February 2008 by [RFC5237] (Arkko, J. and S. Bradner, “IANA Allocation Guidelines for the Protocol Field,” February 2008.).) This document also updates the IANA allocation procedures for DCCP as defined in [RFC4340] (Kohler, E., Handley, M., and S. Floyd, “Datagram Congestion Control Protocol (DCCP),” March 2006.). It updates [RFC2782] (Gulbrandsen, A., Vixie, P., and L. Esibov, “A DNS RR for specifying the location of services (DNS SRV),” February 2000.) to clarify what a service name is and how it is registered, because [RFC2782] (Gulbrandsen, A., Vixie, P., and L. Esibov, “A DNS RR for specifying the location of services (DNS SRV),” February 2000.) simply refers to [RFC1700] (Reynolds, J. and J. Postel, “Assigned Numbers,” October 1994.) when defining service names, which in turn contains now-obsolete copies [RFC3232] (Reynolds, J., “Assigned Numbers: RFC 1700 is Replaced by an On-line Database,” January 2002.) of various IANA registries [PORTREG] (Internet Assigned Numbers Authority (IANA), “Port Numbers Registry,” .)[PROTSERVREG] (Internet Assigned Numbers Authority (IANA), “Protocol and Service Names Registry,” .).

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2. Motivation

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Information about the registration procedures for the port registry has existed in three locations: the forms for requesting port number registrations on the IANA web site [SYSFORM] (Internet Assigned Numbers Authority (IANA), “Application for System (Well Known) Port Number,” .) [USRFORM] (Internet Assigned Numbers Authority (IANA), “Application for User (Registered) Port Number,” .), an introductory text section in the file listing the port number registrations themselves [PORTREG]

(Internet Assigned Numbers Authority (IANA), “Port Numbers Registry,” .), and two brief sections of the IANA Allocation Guidelines [RFC2780] (Bradner, S. and V. Paxson, “IANA Allocation Guidelines For Values In the Internet Protocol and Related Headers,” March 2000.).

Similarly, the procedures surrounding service names have been historically unclear. Service names were originally created as mnemonic identifiers for port numbers without a well-defined syntax, beyond the 14-character limit mentioned on the IANA website [SYSFORM] (Internet Assigned Numbers Authority (IANA), “Application for System (Well Known) Port Number,” .) [USRFORM] (Internet Assigned Numbers Authority (IANA), “Application for User (Registered) Port Number,” .). Even that length limit has not been consistently applied, and some assigned service names are 15 characters long. When service identification via DNS SRV RRs were introduced, the ambiguities in the syntactic definition of the service namespace, together with a requirement by IANA to only assign service names and port numbers in combination, led to the creation of an ad hoc service name registry outside of the control of IANA [SRVREG] (, “DNS SRV Service Types Registry,” .).

It has also been historically unclear if the "name" entries registered in the "Protocol and Service Names Registry" [PROTSERVREG] (Internet Assigned Numbers Authority (IANA), “Protocol and Service Names Registry,” .) can be used as service names. [RFC0952] (Harrenstien, K., Stahl, M., and E. Feinler, “DoD Internet host table specification,” October 1985.) defines the names in that registry as either service names or protocol names. It is likely that these names has been interpreted as being valid service names and consequently have been used, e.g., in SRV records. This motivates why this document merges the 166 protocol and service names defined in that registry into the port number registry [PORTREG] (Internet Assigned Numbers Authority (IANA), “Port Numbers Registry,” .).

This document aggregates all this scattered information into a single reference that aligns and clearly defines the management procedures for both port numbers and service names. It gives more detailed guidance to prospective requesters of ports and service names than the existing documentation, and it streamlines the IANA procedures for the management of the registry, so that management requests can complete in a timely manner.

This document defines rules for registration of service names without associated port numbers, for such usages as DNS SRV records, which was not possible under the previous IANA procedures. These new procedures also merge service name registrations from the non-IANA "ad hoc" registry [SRVREG] (, “DNS SRV Service Types Registry,” .) and from the the IANA "Protocol and Service Names" registry [PROTSERVREG] (Internet Assigned Numbers Authority (IANA), “Protocol and Service Names Registry,” .) into the IANA "Port and Service Name" registry [PORTREG] (Internet Assigned Numbers Authority (IANA), “Port Numbers Registry,” .), which from here on is the single authoritative registry for service names and port numbers.

An additional purpose of this document is to describe the principles that guide the IETF and IANA in their role as the long-term joint stewards of the port number registry. TCP and UDP have been a remarkable success over the last decades. Thousands of applications and application-level protocols have registered ports and service names for their use, and there is every reason to believe that this trend will continue into the future. It is hence extremely important that management of the registry follow principles that ensure its long-term usefulness as a shared resource. Section 7 (Principles for Port Number and Service Name Registry Management) discusses these principles in detail.

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3. Background

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The Transmission Control Protocol (TCP) [RFC0793] (Postel, J., “Transmission Control Protocol,” September 1981.) and the User Datagram Protocol (UDP) [RFC0768] (Postel, J., “User Datagram Protocol,” August 1980.) have enjoyed a remarkable success over the decades as the two most widely used transport protocols on the Internet. They have relied on the concept of "ports" as logical entities for Internet communication. Ports serve two purposes: first, they provide a demultiplexing identifier to differentiate transport sessions between the same pair of endpoints, and second, they may also identify the application protocol and associated service to which processes bind. Newer transport protocols, such as the Stream Control Transmission Protocol (SCTP) [RFC4960] (Stewart, R., “Stream Control Transmission Protocol,” September 2007.) and the Datagram Congestion Control Protocol (DCCP) [RFC4342] (Floyd, S., Kohler, E., and J. Padhye, “Profile for Datagram Congestion Control Protocol (DCCP) Congestion Control ID 3: TCP-Friendly Rate Control (TFRC),” March 2006.) have adopted the concept of ports for their communication sessions and use 16-bit port numbers in the same way as TCP and UDP (and UDP-Lite [RFC3828] (Larzon, L-A., Degermark, M., Pink, S., Jonsson, L-E., and G. Fairhurst, “The Lightweight User Datagram Protocol (UDP-Lite),” July 2004.), a variant of UDP).

Port numbers are the original and most widely used means for application and service identification on the Internet. Ports are 16-bit numbers, and the combination of source and destination port numbers together with the IP addresses of the communicating end systems uniquely identifies a session of a given transport protocol. Port numbers are also known by their corresponding service names such as "telnet" for port number 23 and both "http" and "www" for port number 80.

Hosts running services, hosts accessing services on other hosts, and intermediate devices (such as firewalls and NATs) that restrict services need to agree on which service corresponds to a particular

destination port. Although this is ultimately a local decision with meaning only between the endpoints of a connection, most Internet components use a single, shared view of this association, provided by the Internet Assigned Numbers Authority (IANA) through the port number registry [PORTREG] (Internet Assigned Numbers Authority (IANA), "Port Numbers Registry," .).

Over time, the assumption that a particular port number necessarily implies a particular service may become less true. For example, multiple instances of the same service can run on different ports on the same host, or NATs that support port mapping or registration [I-D.cheshire-nat-pmp] (Cheshire, S., "NAT Port Mapping Protocol (NAT-PMP)," April 2008.)[UPnP] (UPnP Forum, "Internet Gateway Device (IGD) V 1.0," November 2001.) need to offer service instances using the same port on several internal hosts available to the public Internet on different ports. This document assumes, however, that ports are most often used in a conventional manner - where endpoints and intermediate devices all share the common view of the IANA port number registry. Applications either use numeric port numbers directly, look up port numbers based on service names via system calls such as getservbyname() on UNIX, look up port numbers by performing queries for DNS SRV records [RFC2782] (Gulbrandsen, A., Vixie, P., and L. Esibov, "A DNS RR for specifying the location of services (DNS SRV)," February 2000.) [I-D.cheshire-dnsext-dns-sd] (Cheshire, S. and M. Krochmal, "DNS-Based Service Discovery," March 2010.) or determine port numbers in a variety of other ways [RFC1078] (Lottor, M., "TCP port service Multiplexer (TCPMUX)," November 1988.).

Designers of applications and application-level protocols may apply to IANA for an assigned port number and service name for a specific application, and may - after successful registration - assume that no other application will use that port number and service name for its communication sessions. Alternatively, application designers may also only ask for an assigned service name, if their application does not require a fixed port number. The latter alternative is encouraged when possible, in order to conserve the more limited port number space. This includes, for example, applications that use DNS SRV records to look up port numbers at runtime, or transports that use service names not coupled to port numbers, e.g., TCP portnames [I-D.touch-tcp-portnames] (Touch, J., "A TCP Option for Port Names," April 2006.).

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4. Conventions Used in this Document

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The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14, RFC 2119 [RFC2119] (Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels," March 1997.).

5. Service Names

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Service names are the unique key in the Port and Service Name registry. This unique symbolic name for a service may also be used for other purposes, such as DNS SRV records (Gulbrandsen, A., Vixie, P., and L. Esibov, “A DNS RR for specifying the location of services (DNS SRV),” February 2000.) [RFC2782]. Within the registry, this unique key ensures that different services can be unambiguously distinguished, thus preventing name collisions and avoiding confusion about who is the registration owner of a particular entry.

For each service name, there may exist zero or more associated port number assignments. A port number assignment associated with a service name contains the transport protocol, port number and possibly additional data, such as a DCCP service code. There may be more than one service name associated with a particular transport protocol and port. This SHOULD only occur when all such service names are aliases for the same service, such as with "www" and "http".

Service names are assigned on a "first come, first served" basis, as described in Section 8.1 (Port Number and Service Name Registration). Names should be brief and informative, avoiding words or abbreviations that are redundant in the context of the registry (e.g., "port", "service", "protocol", etc.) Names referring to discovery services, e.g., using multicast or broadcast to identify endpoints capable of a given service, SHOULD use an easily identifiable suffix (e.g., "-disc").

5.1. Service Name Usage in DNS SRV Records

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[RFC2782] (Gulbrandsen, A., Vixie, P., and L. Esibov, “A DNS RR for specifying the location of services (DNS SRV),” February 2000.) defines SRV records for the DNS system. One part of the DNS name of an SRV record includes what is called "SERVICE", i.e., a symbolic name for the service. This document updates [RFC2782] (Gulbrandsen, A., Vixie, P., and L. Esibov, “A DNS RR for specifying the location of services (DNS SRV),” February 2000.) in order to clarify that the symbolic name ("SERVICE") SHALL only be a service name as defined in this document that has been registered with IANA and recorded in the port number and service name registry [PORTREG] (Internet Assigned Numbers Authority (IANA), “Port Numbers Registry,” .). This to ensure that only a single registry exist and name collisions can be more easily avoided in the future.

6. Port Number Ranges

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TCP, UDP (and UDP-Lite), SCTP and DCCP use 16-bit namespaces for their port number registries. The port registries for all these transport protocols are subdivided into three ranges of numbers, and Section 7.3 (Variances for Specific Port Number Ranges) describes the IANA procedures for each range in detail:

- the Well Known Ports, also known as the System Ports, from 0-1023 (assigned by IANA)
- the Registered Ports, also known as the User Ports, from 1024-49151 (assigned by IANA)
- the Dynamic Ports, also known as the Private Ports, from 49152-65535 (never assigned)

Of the assignable port ranges (Well Known and Registered, i.e., port numbers 0-49151), individual port numbers are in one of three states at any given time:

- Assigned: Assigned port numbers are currently allocated to the service indicated in the registry.
- Unassigned: Unassigned port numbers are currently available for assignment upon request, as per the procedures outlined in this document.
- Reserved: Reserved port numbers are not available for regular assignment; they are "assigned to IANA" for special purposes. Reserved port numbers include values at the edges of each range, e.g., 0, 1023, 1024, etc., which may be used to extend these ranges or the overall port number space in the future.

In order to keep the size of the registry manageable, IANA typically only records the Assigned and Reserved port numbers and service names in the registry. Unassigned values are typically not explicitly listed. As a data point, when this document was written, approximately 76% of the TCP and UDP Well Known Ports were assigned, and approximately 9% of the Registered Ports were assigned. (As noted, Dynamic Ports are never assigned.)

6.1. Port Numbers and Service Names for Experimentation

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Of the Well Known ports, two TCP and UDP port numbers (1021 and 1022), together with their respective service names ("exp1" and "exp2"), have

been assigned for experimentation with new applications and application-layer protocols that require a port number in the assigned ports ranges [RFC4727] (Fenner, B., “Experimental Values In IPv4, IPv6, ICMPv4, ICMPv6, UDP, and TCP Headers,” November 2006.).
Please refer to Sections 1 and 1.1 of "Assigning Experimental and Testing Numbers Considered Useful" [RFC3692] (Narten, T., “Assigning Experimental and Testing Numbers Considered Useful,” January 2004.) for how these experimental port numbers are to be used.
This document registers the same two port numbers and service names for experimentation with new application-layer protocols over SCTP and DCCP in Section 10.2 (Port Numbers for SCTP and DCCP Experimentation).
Unfortunately, it can be difficult to limit access to these ports. Users SHOULD take measures to ensure that experimental ports are connecting to the intended process. For example, users of these experimental ports might include a 64-bit nonce, once on each segment of a message-oriented channel (e.g., UDP), or once at the beginning of a byte-stream (e.g., TCP), which is used to confirm that the port is being used as intended. Such confirmation of intended use is especially important when these ports are associated with privileged (e.g., system or administrator) processes.

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7. Principles for Port Number and Service Name Registry Management

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Management procedures for the port number and service name registry include allocation of port numbers and service names upon request, as well as coordination of information about existing allocations. The latter includes maintaining contact and description information about assignments, revoking abandoned assignments, and redefining assignments when needed. Of these procedures, port number allocation is most critical, in order to continue to conserve the remaining port numbers. As noted earlier, only ~9% of the Registered Port space is currently assigned. The current rate of assignment is approximately 400 ports/year, and has remained linear for the past 8 years. At that rate, if similar conservation continues, this resource will sustain another 85 years of assignment - without the need to resort to reassignment of released values or revocation. Note that the namespace available for service names is even larger, which allows for a simpler management procedures.

7.1. Past Principles

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Before the publication of this document, the principles of port number and service name management followed a few mostly undocumented

guidelines. They are recorded here for historical purposes, and this document updates them in Section 7.2 (Updated Principles). These principles were:

- TCP and UDP ports were simultaneously allocated when either was requested
- Port numbers were the primary allocation; service names were informative only, and did not have a well-defined syntax
- Port numbers were conserved informally, and sometimes inconsistently (e.g., some services were allocated ranges of many port numbers even where not strictly necessary)
- SCTP and DCCP port number and service name registries were managed separately from the TCP/UDP registries
- Service names could not be assigned in the ports registry without assigning a corresponding port number at the same time

This document attempts to document, clarify and align these guidelines in order to more conservatively manage the limited remaining port number space and to enable and promote the use of service names for service identification without associated port numbers, where possible.

7.2. Updated Principles

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This section summarizes the basic principles by which IANA attempts to conserve the port number space. This description is intended to inform applicants requesting port numbers. IANA decisions are not required to be bound to these principles, however; other factors may come into play, and exceptions may occur where deemed in the best interest of the Internet.

The basic principle of port number registry management is to conserve use of the port space where possible. Extensions to support larger port number spaces would require changing many core protocols of the current Internet in a way that would not be backward compatible and interfere with both current and legacy applications.

Conservation of the port number space recognizes that because this space is a limited resource, applications are expected to participate in the traffic demultiplexing process where feasible. The port numbers are expected to encode as little information as possible that will still enable an application to perform further demultiplexing by itself. In particular:

- IANA will allocate only one assigned port number per service or application

*IANA will allocate only one assigned port number for all versions of a service (e.g., running the service with or without a security mechanism, or for updated variants of a service)

*IANA will allocate only one assigned port number for all different types of devices using or participating in the same service

*IANA will allocate port numbers only for the transport protocols explicitly named in an registration request

*IANA may recover unused port numbers, via the new procedures of de-registration, revocation, and transfer

*IANA may begin assigning service names that do not request a corresponding port number allocation under a simple "First Come, First Served" policy [RFC5226] (Narten, T. and H. Alvestrand, “Guidelines for Writing an IANA Considerations Section in RFCs,” May 2008.) (assignments involving port numbers still require "Expert Review")

A given service is expected to further demultiplex messages where possible. For example, applications and protocols are expected to include in-band version information, so that future versions of the application or protocol can share the same allocated port. Applications and protocols are also expected to be able to efficiently use a single allocated port for multiple sessions, either by demultiplexing multiple streams within one port, or using the allocated port to coordinate using dynamic ports for subsequent exchanges (e.g., in the spirit of FTP [RFC0959] (Postel, J. and J. Reynolds, “File Transfer Protocol,” October 1985.)).
Ports are used in various ways, notably:

*as endpoint process identifiers

*as application protocol identifiers

*for firewall filtering purposes

The process and protocol identifier use suggests that anything a single process can demultiplex, or that can be encoded into a single protocol, should be. The firewall filtering use suggests that some uses that could be de-multiplexed or encoded must be separated to allow for firewall management. Note that this latter use is much less sound, because port numbers have meaning only for the two endpoints involved in a connection, and drawing conclusions about the service that generated a given flow based on observed port numbers is inherently problematic. Further, previous separation of protocol variants based on security capabilities (e.g., HTTP on port 80 vs. HTTPS on port 443) is

not recommended for new protocols, because all should be security-capable and capable of negotiating the use of security in-band.
IANA will begin assigning protocol numbers only for those transport protocols explicitly included in a registration request. This ends the long-standing practice of automatically assigning a port number to an application for both TCP and a UDP, even if the request is only for one of these transport protocols. The new allocation procedure conserves resources by only allocating a port number to an application for those transport protocols (TCP, UDP, SCTP and/or DCCP) it actually uses. The port number will be marked as Reserved - instead of Assigned - in the port number registries of the other transport protocols. When applications start supporting the use of some of those additional transport protocols, their implementors MUST request IANA to convert the reservation into an assignment. An application MUST NOT assume that it can use a port number assigned to it for use with one transport protocol with another transport protocol without asking IANA to convert the reservation into an assignment.
Conservation of port numbers is improved by procedures that allow previously allocated port numbers to become Unassigned, either through de-registration or through revocation, and by a procedure that lets application designers transfer an allocated but unused port number to a new application. Section 8 (IANA Procedures for Managing the Port Number and Service Name Registry) describes these procedures, which so far were undocumented. Port number conservation is also improved by recommending that applications that do not require an allocated port, e.g., because they can use service-name-based lookups, chose this option and only register a service name.

7.3. Variances for Specific Port Number Ranges

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Section 6 (Port Number Ranges) describes the different port number ranges. It is important to note that IANA applies slightly different procedures when managing the different ranges of the port number registry:

- Ports in the Dynamic Ports range (49152-65535) have been specifically set aside for local and dynamic use and cannot be registered through IANA. Applications may simply use them for communication without any sort of registration. On the other hand, applications MUST NOT assume that a specific port number in the Dynamic Ports range will always be available for communication at all times, and a port number in that range hence MUST NOT be used as a service identifier.

- Ports in the Registered Ports range (1024-49151) are available for registration through IANA, and MAY be used as service

identifiers upon successful registration. Because registering a port number for a specific application consumes a fraction of the shared resource that is the port number registry, IANA will require the requester to document the intended use of the port number. This documentation will be input to the "Expert Review" allocation procedure [RFC5226] (Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs," May 2008.), by which IANA will have a technical expert review the request to determine whether to grant the registration. The submitted documentation MUST explain why using a port number in the Dynamic Ports range is unsuitable for the given application.

*Ports in the Well Known Ports range (0-1023) are also available for registration through IANA. Because the Well Known Ports range is both the smallest and the most densely allocated, the requirements for new allocations are more strict than those for the Registered Ports range, and will only be granted under the "IETF Review" allocation procedure [RFC5226] (Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs," May 2008.). A request for a Well Known port number MUST document why using a port number from both the Registered Ports and Dynamic Ports ranges is unsuitable for the given application.

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8. IANA Procedures for Managing the Port Number and Service Name Registry

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This section describes the process for requests associated with IANA's management of the port number and service name registry. Such requests include initial registration, de-registration, re-use, changes to the service name, as well as updates to the contact information or description associated with an assignment. Revocation is initiated by IANA.

8.1. Port Number and Service Name Registration

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Registration refers to the allocation of port numbers or service names to applicants. All such registrations are made from port numbers or service names that are Unassigned or Reserved at the time of the allocation. Unassigned numbers and names are allocated as needed, and without further explanation. Reserved numbers and names are assigned only after review by IANA and the IETF, and are accompanied by a

statement explaining the reason a Reserved number or name is appropriate for this action.

When a registration for one or more (but not all) transport protocols is approved, the port number for the non-requested transport protocol(s) will be marked as Reserved. IANA SHOULD NOT assign that port number to any other application or service until no other port numbers remain Unassigned in the requested range. The current registration owner of a port number MAY register these Reserved port numbers for other transport protocols when needed.

Service names, on the other hand, are not tied to a specific transport protocol, and registration requests for only a service name (but not a port number) allocate that service name for use with all transport protocols.

A port number or service name registration consists of the following information:

*Registration Owner: Name and email address of the owner of the registration. This is REQUIRED. For registrations done through IETF-published RFCs, the registration ownership will belong to the IETF and not the technical contact persons.

*Registration Technical Contact: Name and email address of the technical contact person for the registration. This is REQUIRED. For individuals, this is the same as the Registration Owner; for organizations, this is a point of contact at that organization. Additional address information MAY be provided. For registrations done through IETF-published RFCs, one or more technical contact persons SHALL be provided.

*Service Name: A desired unique service name for the service associated with the registration request MUST be provided, for use in various service selection and discovery mechanisms (including, but not limited to, DNS SRV records [RFC2782] (Gulbrandsen, A., Vixie, P., and L. Esibov, “A DNS RR for specifying the location of services (DNS SRV),” February 2000.)). Valid service names MUST only contain these US-ASCII [ANSI.X3-4.1986] (American National Standards Institute, “Coded Character Set - 7-bit American Standard Code for Information Interchange,” 1986.) characters: letters from A to Z, digits from 0 to 9, and hyphens ("-", ASCII 0x2D or decimal 45). They MUST be at least one character and no more than fifteen characters long, MUST NOT begin or end with a hyphen, and MUST NOT consist of only digits (in order to be distinguishable from port numbers, which are typically written as all digits). In order to be unique, they MUST NOT be identical to any currently registered service names in the IANA registry [PORTREG] (Internet Assigned Numbers Authority (IANA), “Port Numbers Registry,” .). Service names are case-insensitive; they may be provided and entered into the

registry with mixed case (e.g., for clarity), but for the purposes of comparison, the case is ignored.

*Port Number: If assignment of port number(s) is desired, either the currently Unassigned port number(s) the requester suggests for allocation or the tag "ANY" MUST be provided. If only a service name is to be assigned, this field MUST be empty. If specific port numbers are requested, IANA is encouraged to allocate the suggested numbers. If the tag "ANY" is specified, IANA will choose a suitable number from the Registered Ports range. Note that the applicant MUST NOT use the suggested ports prior to the completion of the registration.

*Transport Protocol: The transport protocol(s) for which the allocation is requested MUST be provided. This field is currently limited to one or more of TCP, UDP, SCTP, and DCCP.

*Service Code: A desired unique service code for the service associated with the registration request. Service codes are specific to the DCCP protocol [I-D.ietf-dccp-serv-codes] (Fairhurst, G., "The DCCP Service Code," May 2009.); the request MUST include a desired service code when the registration requests includes DCCP as a transport protocol, and MUST NOT include one otherwise.

*Description: A short description of the service associated with the registration request is REQUIRED. It should avoid all but the most well known acronyms.

*Reference: A reference document describing the protocol or application using this port, including whether the protocol supports either broadcast, multicast, or anycast communication. For registration requests for Registered Ports, this documentation MUST explain why a port number in the Dynamic Ports range is unsuitable for the given application. For registration requests for Well Known Ports, this documentation MUST explain why a port number in the Registered Ports or Dynamic Ports ranges is unsuitable.

"Early" registration requests can be made by IETF working groups without including such a reference document, although it is RECOMMENDED that at least a reference to an Internet Draft describing the work in progress is provided.

When IANA receives a registration request containing the above information, they SHALL initiate an "Expert Review" [RFC5226] (Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs," May 2008.) in order to determine whether an assignment should be made. For requests for service names that do not

include port number assignments, IANA MAY, at its discretion, skip the "Expert Review" procedure and assign the service name under a simple "First Come First Served" policy [RFC5226] (Narten, T. and H. Alvestrand, “Guidelines for Writing an IANA Considerations Section in RFCs,” May 2008.).

8.2. Port Number and Service Name De-Registration

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The original requesters of a granted port number assignment can return the port number to IANA at any time if they no longer have a need for it. The port number will be de-registered and will be marked as Reserved. IANA should not re-assign port numbers that have been de-registered until all other available port numbers in the specific range have been assigned.

Before proceeding with a port number de-registration, IANA needs to reasonably establish that the value is actually no longer in use. Because there is much less danger of exhausting the service name space compared to the port number space, it is RECOMMENDED that a given service name remain assigned even after all associated port number assignments have become de-registered. Under this policy, it will appear in the registry as if it had been created through a service name registration request that did not include any port numbers.

On rare occasions, it may still be useful to de-register a service name. In such cases, IANA will mark the service name as Reserved. IANA will involve their IESG-appointed expert in such cases.

8.3. Port Number and Service Name Re-Use

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If the original requesters of a granted port number assignment no longer have a need for the registered number, but would like to re-use it for a different application, they can submit a request to IANA to do so.

Logically, port number re-use is to be thought of as a de-registration (Section 8.2 (Port Number and Service Name De-Registration)) followed by an immediate re-registration (Section 8.1 (Port Number and Service Name Registration)) of the same port number for a new application. Consequently, the information that needs to be provided about the proposed new use of the port number is identical to what would need to be provided for a new port number allocation for the specific ports range.

Because there is much less danger of exhausting the service name space compared to the port number space, it is RECOMMENDED that the original service name associated with the prior use of the port number remains assigned, and a new service be created and associated with the port

number. This is again consistent with viewing a re-use request as a de-registration followed by an immediate re-registration. Re-using an assigned service name for a different application is NOT RECOMMENDED. IANA needs to carefully review such requests before approving them. In some instances, the Expert Reviewer will determine that the application that the port number was assigned to has found usage beyond the original requester, or that there is a concern that it may have such users. This determination MUST be made quickly. A community call concerning revocation of a port number (see below) MAY be considered, if a broader use of the port number is suspected.

8.4. Port Number and Service Name Revocation

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A port number revocation can be thought of as an IANA-initiated de-registration (Section 8.2 (Port Number and Service Name De-Registration)), and has exactly the same effect on the registry. Sometimes, it will be clear that a specific port number is no longer in use and that IANA can revoke it and mark it as Reserved. At other times, it may be unclear whether a given assigned port number is still in use somewhere in the Internet. In those cases, IANA must carefully consider the consequences of revoking the port number, and SHOULD only do so if there is an overwhelming need.

With the help of their IESG-appointed Expert Reviewer, IANA SHALL formulate a request to the IESG to issue a four-week community call concerning the pending port number revocation. The IESG and IANA, with the Expert Reviewer's support, SHALL determine promptly after the end of the community call whether revocation should proceed and then communicate their decision to the community. This procedure typically involves similar steps to de-registration except that it is initiated by IANA.

Because there is much less danger of exhausting the service name space compared to the port number space, revoking service names is NOT RECOMMENDED.

8.5. Port Number and Service Name Transfers

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The value of port numbers and service names is defined by their careful management as a shared Internet resource, whereas enabling transfer allows the potential for associated monetary exchanges. As a result, the IETF does not permit port number or service name assignments to be transferred between parties, even when they are mutually consenting. The appropriate alternate procedure is a coordinated de-registration and registration: The new party requests the port number or service

name via a registration and the previous party releases its assignment via the de-registration procedure outlined above.
With the help of their IESG-appointed Expert Reviewer, IANA SHALL carefully determine if there is a valid technical, operational or managerial reason before performing the transfer.

8.6. Maintenance Issues

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The previous procedures help IANA manage the defining properties of the port name and service name registry. There are additional procedures which are administrative and help IANA maintain non-defining information in a registration. This includes changes to the Port Description and changes to Technical Contact information. (Note that Registration Owner cannot be changed; see Section 8.5 (Port Number and Service Name Transfers) above.) These changes are coordinated by IANA in an informal manner, and may be initiated by either the registrant or by IANA, e.g., the latter when requesting an update to current contact information.

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9. Security Considerations

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The IANA guidelines described in this document do not change the security properties of UDP, TCP, SCTP, or DCCP.
Assignment of a port number or service name does not in any way imply an endorsement of an application or product, and the fact that network traffic is flowing to or from a registered port number does not mean that it is "good" traffic, or even that it is used by the assigned service. Firewall and system administrators should choose how to configure their systems based on their knowledge of the traffic in question, not whether there is a port number or service name registered or not.
Services are expected to include support for security, either as default or dynamically negotiated in-band. The use of separate port number or service name assignments for secure and insecure variants of the same service is to be avoided in order to discourage the deployment of insecure services.

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10. IANA Considerations

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This document obsoletes Sections 8 and 9.1 of the March 2000 IANA Allocation Guidelines [RFC2780] (Bradner, S. and V. Paxson, “IANA

Allocation Guidelines For Values In the Internet Protocol and Related Headers," March 2000.).
Upon approval of this document, IANA is requested to contact the maintainer of the [SRVREG] (, "DNS SRV Service Types Registry," .) registry, in order to merge the contents of that private registry into the official IANA registry. It is expected that the contents of [SRVREG] (, "DNS SRV Service Types Registry," .) will at that time be replaced with pointers to the IANA registry and to this RFC.
Similarly, IANA is instructed to create a new service name entry in the port number registry [PORTREG] (Internet Assigned Numbers Authority (IANA), "Port Numbers Registry," .) for any entry in the "Protocol and Service Names" registry [PROTSERVREG] (Internet Assigned Numbers Authority (IANA), "Protocol and Service Names Registry," .) that does not already have one assigned. After that, IANA should investigate if the "Protocol and Service Names" registry [PROTSERVREG] (Internet Assigned Numbers Authority (IANA), "Protocol and Service Names Registry," .) can be retired.

10.1. Service Name Consistency

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Section 8.1 (Port Number and Service Name Registration) defines which character strings are well-formed service names, which until now had not been clearly defined. The definition in Section 8.1 (Port Number and Service Name Registration) was chosen to allow maximum compatibility of service names with current and future service discovery mechanisms.
As of August 5, 2009 approximately 98% of the so-called "Short Names" from existing port number registrations [PORTREG] (Internet Assigned Numbers Authority (IANA), "Port Numbers Registry," .) meet the rules for legal service names stated in Section 8.1 (Port Number and Service Name Registration), and hence will be used unmodified.
The remaining approximately 2% of the exiting "Short Names" are not suitable to be used directly as well-formed service names because they contain illegal characters such as asterisks, dots, plusses, slashes, or underscores. All existing "Short Names" conform to the length requirement of 15 characters or less. For these unsuitable "Short Names", listed in the table below, the service name will be the Short Name with any illegal characters replaced by hyphens. IANA SHALL add an alias to the registry that assigns a well-formed service name for the existing service but otherwise duplicates the original assignment information. In the description field of the new alias, IANA SHALL record that it assigns a well-formed service name for the previous service and point to the original assignment. In the description field of the original assignment, IANA SHALL add a note that the service name is historic, is not usable with many common service discovery

mechanisms, and provide a reference to the new alias, which can be used in this way.
Names containing illegal characters to be replaced by hyphens:

914c/g	acmaint_dbd	acmaint_transd
atex_elmd	avanti_cdp	badm_priv
badm_pub	bdir_priv	bdir_pub
bmc_ctd_ldap	bmc_patroldb	boks_clntd
boks_servc	boks_servm	broker_service
bues_service	canit_store	cedros_fds
cl/1	contamac_icm	corel_vncadmin
csc_proxy	cvc_hostd	dbcontrol_agent
dec_dlm	dl_agent	documentum_s
dsmeter_iatc	dsx_monitor	elpro_tunnel
elvin_client	elvin_server	encrypted_admin
erunbook_agent	erunbook_server	esri_sde
EtherNet/IP-1	EtherNet/IP-2	event_listener
flr_agent	gds_db	ibm_wrless_lan
iceedcp_rx	iceedcp_tx	iclcnet_svinfo
idig_mux	ife_icorp	instl_bootc
instl_boots	intel_rci	interhdl_elmd
lan900_remote	LiebDevMgmt_A	LiebDevMgmt_C
LiebDevMgmt_DM	mapper-ws_ethd	matrix_vnet
mdbs_daemon	menandmice_noh	msl_lmd
nburn_id	ncr_ccl	nds_sso
netmap_lm	nms_topo_serv	notify_srvr
novell-lu6.2	nuts_bootp	nuts_dem
ocs_amu	ocs_cmu	pipe_server
pra_elmd	printer_agent	redstorm_diag
redstorm_find	redstorm_info	redstorm_join
resource_mgr	rmonitor_secure	rsvp_tunnel
sai_sentlm	sge_execd	sge_qmaster
shiva_confsrvr	sql*net	srvc_registry
stm_pproc	subntbcst_tftp	udt_os
universe_suite	veritas_pbx	vision_elmd
vision_server	wrs_registry	z39.50

In the case of "whois++", the service name will be "whoisplusplus".

10.2. Port Numbers for SCTP and DCCP Experimentation

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Two Well Known UDP and TCP ports, 1021 and 1022, have been reserved for experimental use [RFC4727] (Fenner, B., "Experimental Values In IPv4, IPv6, ICMPv4, ICMPv6, UDP, and TCP Headers," November 2006.). This document registers the same port numbers for SCTP and DCCP, and also instructs IANA to automatically register these two port numbers for any new transport protocol that will in the future share the port number namespace.

Note that these port numbers are meant for temporary experimentation and development in controlled environments. Before using these port numbers, carefully consider the advice in Section 6.1 (Port Numbers and Service Names for Experimentation) in this document, as well as in Sections 1 and 1.1 of "Assigning Experimental and Testing Numbers Considered Useful" [RFC3692] (Narten, T., "Assigning Experimental and Testing Numbers Considered Useful," January 2004.). Most importantly, application developers must request a permanent port number assignment from IANA as described in Section 8.1 (Port Number and Service Name Registration) before any kind of non-experimental deployment.

Registration Technical Contact	IESG <iesg@ietf.org>
Registration Owner	IETF <iesg@ietf.org>
Transport Protocol	SCTP, DCCP
Port Number	1021
Port Name	RFC3692-style Experiment 1
Service Name	exp1
Reference	[RFCyyyy]

Registration Technical Contact	IESG <iesg@ietf.org>
Registration Owner	IETF <iesg@ietf.org>
Transport Protocol	SCTP, DCCP
Port Number	1022
Port Name	RFC3692-style Experiment 2
Service Name	exp2
Reference	[RFCyyyy]

[RFC Editor Note: Please change "yyyy" to the RFC number allocated to this document before publication.]

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10.3. Updates to DCCP Registries

This document updates the IANA allocation procedures for the DCCP Port Number and DCCP Service Codes Registries [RFC4340] (Kohler, E., Handley, M., and S. Floyd, “Datagram Congestion Control Protocol (DCCP),” March 2006.).

10.3.1. DCCP Service Code Registry

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Service Codes are allocated first-come-first-served according to Section 19.8 of the DCCP specification [RFC4340] (Kohler, E., Handley, M., and S. Floyd, “Datagram Congestion Control Protocol (DCCP),” March 2006.). This document updates that section by extending the guidelines given there in the following ways:

- IANA MAY assign new Service Codes without seeking Expert Review using their discretion, but SHOULD seek expert review if a request seeks more than five Service Codes.

- IANA should feel free to contact the DCCP Expert Reviewer with questions on any registry, regardless of the registry policy, for clarification or if there is a problem with a request [RFC4340] (Kohler, E., Handley, M., and S. Floyd, “Datagram Congestion Control Protocol (DCCP),” March 2006.).

10.3.2. DCCP Port Numbers Registry

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The DCCP ports registry is defined by Section 19.9 of the DCCP specification [RFC4340] (Kohler, E., Handley, M., and S. Floyd, “Datagram Congestion Control Protocol (DCCP),” March 2006.). Allocations in this registry require prior allocation of a Service Code. Not all Service Codes require IANA-registered ports. This document updates that section by extending the guidelines given there in the following way:

- IANA should normally assign a value in the range 1024-49151 to a DCCP server port. IANA allocation requests to allocate port numbers in the Well Known Ports range (0 through 1023), require an "IETF Review" [RFC5226] (Narten, T. and H. Alvestrand, “Guidelines for Writing an IANA Considerations Section in RFCs,” May 2008.) prior to allocation by IANA [RFC4340] (Kohler, E., Handley, M., and S. Floyd, “Datagram Congestion Control Protocol (DCCP),” March 2006.).

*IANA MUST NOT allocate a single Service Code value to more than one DCCP server port.

*The set of Service Code values associated with a DCCP server port should be recorded in the ports registry.

*A request for additional Service Codes to be associated with an already allocated Port Number requires Expert Review. These requests will normally be accepted when they originate from the contact associated with the port registration. In other cases, these applications will be expected to use an unallocated port, when this is available.

The DCCP specification [RFC4340] (Kohler, E., Handley, M., and S. Floyd, "Datagram Congestion Control Protocol (DCCP)," March 2006.) notes that a short port name MUST be associated with each DCCP server port that has been registered. This document requires that this name MUST be unique.

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11. Acknowledgments

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