GENERAL

list of port numbers in networking

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Understanding Port Numbers in Networking: A Comprehensive Guide

In the world of computer networking, the term **port number** often appears in discussions about firewalls, server configurations, and application protocols. Yet, many users still wonder why port numbers matter and how they shape the flow of data across the internet. This article provides a deep dive into the concept of port numbers, offers a definitive **list of port numbers in networking**, and explains how to manage them for optimal performance and security.

What Are Port Numbers?

Port numbers are logical identifiers that help direct traffic to the correct application or service on a device. Think of a port as a door number in a large apartment building: the building's address is the IP address, while the door number tells the mailman exactly where to deliver the package. Similarly, a port number tells a network stack which process should receive the incoming data packet.

Each TCP or UDP packet contains a source port and a destination port. The combination of an IP address and a port number forms a socket, the endpoint for network communication. Without port numbers, a host would have no way to differentiate between multiple simultaneous connections.

How Port Numbers Work in Practice

When a client initiates a connection to a server, it first selects an unused high-numbered port (often called a **ephemeral port**) as its source. The server listens on a fixed port (e.g., 80 for HTTP). The packet carries the source and destination port numbers, allowing the server's operating system to deliver the data to the correct application. This mechanism is fundamental to protocols like TCP, which ensure reliable, ordered delivery, and UDP, which offers faster, connectionless communication.

The Three Port Ranges

Port numbers are divided into three ranges, each with a specific purpose:

- Well Known Ports (0–1023): Reserved for privileged services and protocols (e.g., HTTP, FTP, SSH). These ports are defined by the Internet Assigned Numbers Authority (IANA) and are globally recognized.
- Registered Ports (1024–49151): Used by applications that are not as universally standardized but still require a unique number. Many commercial services use these ports.
- Dynamic/Private Ports (49152–65535): These are typically assigned automatically by the operating system for client-side connections. They are not reserved for any specific service.

Understanding these ranges is crucial when configuring firewalls, NAT tables, or troubleshooting connectivity issues.

A Definitive List of Common Port Numbers

Below is a curated list of frequently used port numbers, grouped by protocol and service category. This **list of port numbers in networking** is a handy reference for network administrators, developers, and security professionals.

Web and Application Services

- HTTP – 80 (TCP)
- HTTPS – 443 (TCP)
- HTTP/2 – 443 (TCP, over TLS)
- WebSocket – 80 or 443 (TCP)
- FTP (Control) – 21 (TCP)
- FTP (Data) – 20 (TCP)
- FTPS (Implicit) – 990 (TCP)
- FTPS (Explicit) – 21 (TCP)
- SSH – 22 (TCP)
- Telnet – 23 (TCP)
- SMTP – 25 (TCP)
- POP3 – 110 (TCP)
- IMAP – 143 (TCP)
- IMAPS – 993 (TCP)
- IMAP4 – 143 (TCP)
- LDAP – 389 (TCP/UDP)
- LDAPS – 636 (TCP)
- RDP – 3389 (TCP)
- SMB (CIFS) – 445 (TCP)
- DNS – 53 (TCP/UDP)
- DHCP – 67/68 (UDP)
- NTP – 123 (UDP)
- MySQL – 3306 (TCP)
- PostgreSQL – 5432 (TCP)
- MongoDB – 27017 (TCP)
- Redis – 6379 (TCP)
- MongoDB – 27017 (TCP)
- Elasticsearch – 9200 (TCP)
- RabbitMQ – 5672 (TCP)
- Kafka – 9092 (TCP)
- MQTT – 1883 (TCP)
- HTTPS (QUIC) – 443 (UDP)

System and Management Services

- SSH – 22 (TCP)
- Telnet – 23 (TCP)
- SNMP – 161 (UDP)
- SNMP Trap – 162 (UDP)
- Syslog – 514 (UDP)
- ICMP – not a port but a protocol used for ping and traceroute
- HTTPS – 443 (TCP)
- LDAP – 389 (TCP/UDP)

Mail and Messaging

- SMTP – 25 (TCP)
- SMTPS – 465 (TCP)
- SMTP Submission – 587 (TCP)

- POP3 – 110 (TCP)
- IMAP – 143 (TCP)
- IMAPS – 993 (TCP)
- IMAP4 – 143 (TCP)

File Transfer and Remote Access

- FTP – 21 (TCP)
- FTPS – 990 (TCP)
- SFTP – 22 (TCP)
- RDP – 3389 (TCP)
- VNC – 5900–5901 (TCP)
- Telnet – 23 (TCP)

Finding the Right Port Number for Your Service

When developing an application or setting up a new service, selecting the appropriate port number is essential. Here are the steps to determine the correct port:

1. Check the Protocol: Identify whether your service uses TCP or UDP. Some protocols, like DNS, operate on both.
2. Consult IANA or RFCs: IANA maintains the official list of well known and registered ports. RFC documents (e.g., RFC 6335) also provide guidance.
3. Consider Existing Services: Avoid conflicts with other services on the same host. Use the netstat or ss command to see which ports are in use.
4. Use Non Standard Ports for Security: While not a replacement for encryption, moving a service to a non standard port can reduce automated scanning attacks.
5. Document the Choice: Keep a configuration file or ticket that records the port number, protocol, and any related firewall rules.

Managing Port Numbers in Firewalls and NAT

Firewalls and Network Address Translation (NAT) devices rely heavily on port numbers to filter traffic. Proper configuration ensures that only legitimate traffic reaches your services while protecting against unwanted access.

Firewall Rules

When writing firewall rules, use explicit port numbers and protocols. For example, a rule that allows HTTP traffic might look like:

iptables -A INPUT -p tcp --dport 80 -j ACCEPT

Similarly, to block a port, use:

iptables -A INPUT -p tcp --dport 23 -j DROP

NAT Port Forwarding

Port forwarding is commonly used to expose services behind a router. For instance, to forward external port 8080 to an internal web server on port 80:

iptables -t nat -A PREROUTING -p tcp --dport 8080 -j DNAT --to-destination 192.168.1.10:80

Understanding port mappings is essential for services like VPNs, remote desktop, and cloud applications.

Tools for Discover

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