

Understanding Protocols, Ports, and Sockets

Protocols

- Computers communicate with each other with network protocols.
- Protocols are rules governing how machines exchange data and enable effective communication.
- In an operating system (OS), a protocol runs as a process or service.

Ports

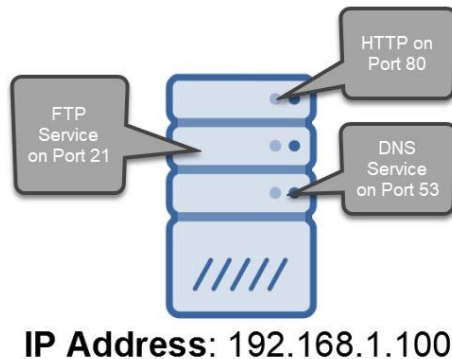
- Ports are logical constructs that bind a unique port number to a protocol process or service.

Sockets

- Sockets are a combination of an IP address and a port number, for example, 192.168.1.1:80.

Why We Need Ports and Sockets

- Computers require ports because of network application multitasking.
- Because a computer may have only one IP address, it needs ports to differentiate network protocols and services running on it.
- TCP/IP has 65,536 ports available



Port Type	Port Numbers	Description
Well Known Ports	0 – 1023	Assigned to well-known protocols.
Registered Ports	1024 – 49,151	Registered to specific protocols.
Dynamic Ports	49,152 – 65,535	Not registered and used for any purpose.

Protocols & Port Numbers

Service, Protocol, or Application	Port Number(s)	TCP or UDP
FTP (File Transfer Protocol)	20, 21	TCP
Secure FTP (SFTP)	22	TCP
SSH (Secure Shell Protocol)	22	TCP
Telnet	23	TCP
SMTP (Simple Mail Transfer Protocol)	25	TCP
DNS (Domain Name System)	53	UDP
DHCP (Dynamic Host Configuration Protocol)	67, 68	UDP
TFTP (Trivial File Transfer Protocol)	69	UDP
HTTP (Hypertext Transfer Protocol)	80	TCP
POP3 (Post Office Protocol version 3)	110	TCP

Protocols & Port Numbers

Service, Protocol, or Application	Port Number(s)	TCP or UDP
NTP (Network Time Protocol)	123	UDP
IMAP4 (Internet Message Access Protocol version 4)	143	TCP
SNMP (Simple Network Management Protocol)	161	UDP
LDAP (Lightweight Directory Access Protocol)	389	TCP
HTTPS (Hypertext Transfer Protocol Secure)	443	TCP
Server Message Block (SMB)	445	TCP
LDAPS (Lightweight Directory Access Protocol Secure)	636	TCP
RDP (Remote Desktop Protocol)	3389	TCP
ITU Telecommunication Standardization Sector A/V Recommendation (H.323)	1720	TCP
Session Initiation Protocol (SIP)	5060, 5061	TCP