

UDP

- The User Datagram Protocol. Its characteristics are:-
 - Packet-oriented
 - Connectionless
 - Unreliable
- UDP adds almost nothing to the IP network layer over which it is transported. It just introduces the concept of a **port** (a concept it shares with TCP as we will soon see).
- A port is an abstraction which can be regarded as a transport-layer address (remember the role of the transport layer) which uniquely identifies a particular process (or endpoint) on the destination node

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- The UDP header is very brief...

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
E t h	Destination MAC (48)																																			
	Destination MAC (48)																Source MAC (48)																			
																	Source MAC (48)																			
	Ethertype (16)																																			
I P v 4	Version (4)				IHL (4)				TOS/DSCP (8)								Total Length (16),																			
	Identification (16)																0		DF		MF		Fragment Offset (13)													
	TTL (8)								Protocol (8)								Header Checksum (16)																			
	Source IP Address (32)																																			
	Destination IP Address (32)																																			
	Options (32)																																			
U D P	Source Port (16)																Destination Port (16)																			
	Length (16)																Checksum (16)																			

- The checksum is sometimes ignored...
 - Most datalink layer protocols include some form of error-checking (e.g. Ethernet CRC)
 - For some data types (e.g. VoIP), timely but (slightly) corrupt data is better than late but accurate data

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- Services **listen** on **well-known** ports.
 - DNS on UDP port 53
 - Syslog on 514
 - SIP on 5060
- These are administered by IANA (the Internet Assigned Numbers Authority) and the definitive list is maintained at <http://www.iana.org/assignments/port-numbers>
- Another good place to look these up is the /etc/services file on a Linux box or the %WinDir%\system32\drivers\etc\services file on Windows

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- When a client wants to communicate with a UDP server, it starts by allocating a randomly-chosen UDP port > 1024 . This will be the source UDP port.
- It will then transmit to the server on the destination port (e.g. one of the well-known ports mentioned on the previous slide).
- The server will reply with a UDP packet from the well-known port back to the port the client transmitted the request from
- The combination of (source IP address, source UDP port, destination IP address, destination UDP port) uniquely identifies this “session” (although the concept of a session is artificial with the connectionless UDP protocol)

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- When the client transmits its packet to the server, it has no way to know if there actually is a service (i.e. process) listening on this port at the destination. If not, the network (IP) layer on the server will return an ICMP “Port Unreachable” message

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No.	Time	Source	Destination	Protocol	Info
6	38.937921	192.168.78.113	192.168.78.250	UDP	Source port: 1468 Destination port: 12345
7	38.941897	192.168.78.250	192.168.78.113	ICMP	Destination unreachable (Port unreachable)

Frame 7 (70 bytes on wire, 70 bytes captured)

- Ethernet II, Src: Cisco_8b:7d:cc (00:b0:c2:8b:7d:cc), Dst: Belkin_1b:c3:ef (00:11:50:1b:c3:ef)
- Internet Protocol, Src: 192.168.78.250 (192.168.78.250), Dst: 192.168.78.113 (192.168.78.113)
- Internet Control Message Protocol
 - Type: 3 (Destination unreachable)
 - Code: 3 (Port unreachable)
 - Checksum: 0x5fb5 [correct]
- Internet Protocol, Src: 192.168.78.113 (192.168.78.113), Dst: 192.168.78.250 (192.168.78.250)
 - Version: 4
 - Header length: 20 bytes
 - Type of service: 0x00 (None)
 - Total Length: 34
 - Identification: 0x473f (18239)
 - Flags: 0x00
 - Fragment offset: 0
 - Time to live: 127
 - Protocol: UDP (0x11)
 - Header checksum: 0xd5cf [correct]
 - Source: 192.168.78.113 (192.168.78.113)
 - Destination: 192.168.78.250 (192.168.78.250)
- User Datagram Protocol, Src Port: 1468 (1468), Dst Port: 12345 (12345)

```
0000  00 11 50 1b c3 ef 00 b0 c2 8b 7d cc 00 00 00 00  .P.....}...E.
0010  00 38 dc 4b 00 00 ff 01 bf fc c0 a8 4e fa c0 a8  .8.K....N...
0020  4e 71 03 03 5f b5 00 00 00 00 45 00 00 22 47 3f  Nq.....E..G?
0030  00 00 7f 11 d5 cf c0 a8 4e 71 c0 a8 4e fa 05 bc  .....Nq..N...
0040  30 39 00 0e 67 44 09 ..nD
```

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