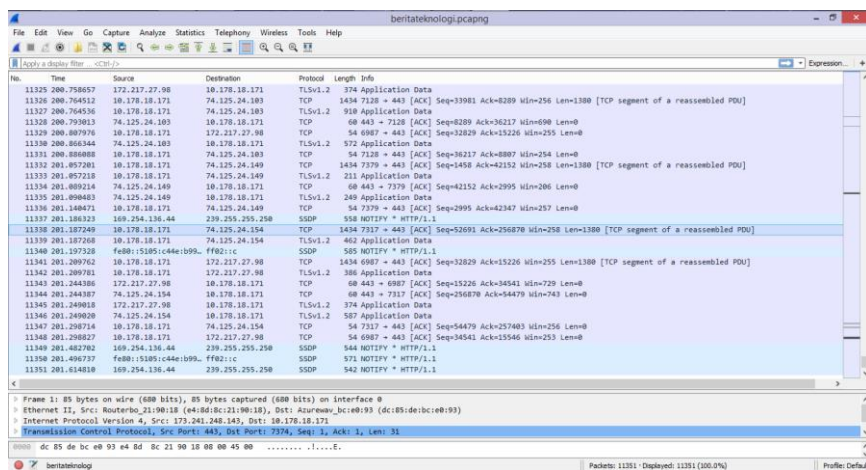
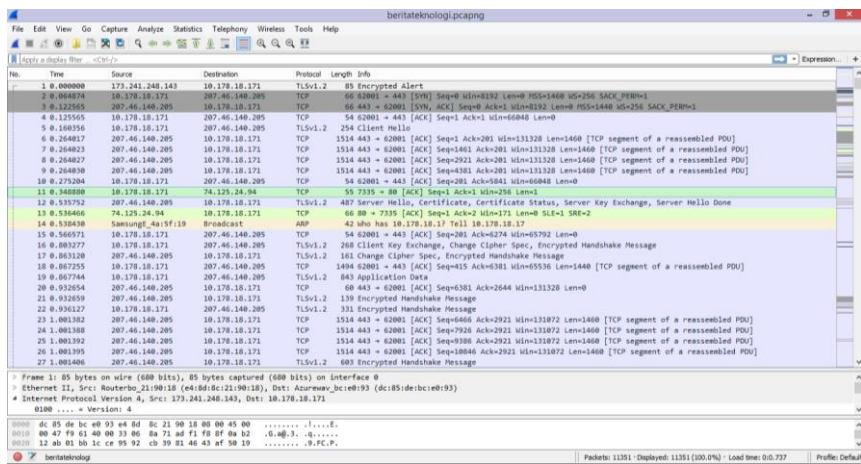


ANALISA LALU-LINTAS JARINGAN KOMPUTER

A. Capture menggunakan Wireshark

1. www.beritateknologi.com
waktu : 3 menit



The screenshot shows a Wireshark window titled 'beritateknologi.pcapng'. The main pane displays a list of captured packets. The columns are: No., Time, Source, Destination, Protocol, Length, and Info. The packets are all TCP segments of length 55 bytes, identified as 'segment of a reassembled PDU'. The source IP is consistently 10.178.18.171, and the destination IP varies across different ranges. Below the packet list, the packet details pane shows the structure of a frame: Ethernet II, Internet Protocol Version 4, and a version 4 header.

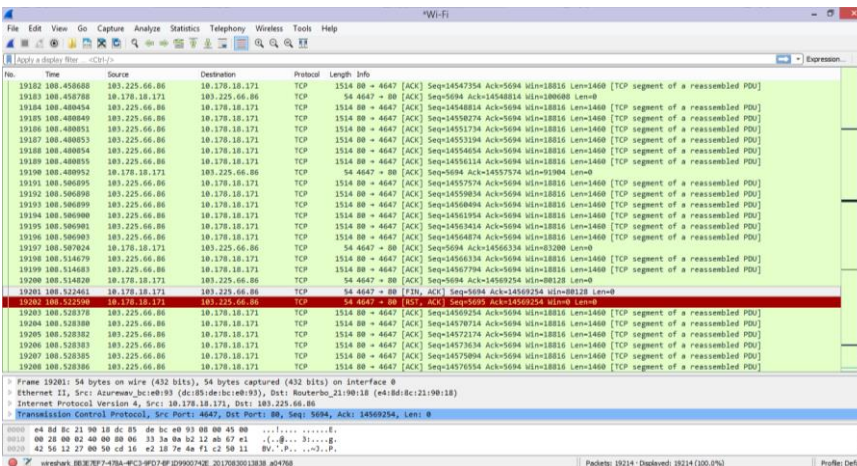
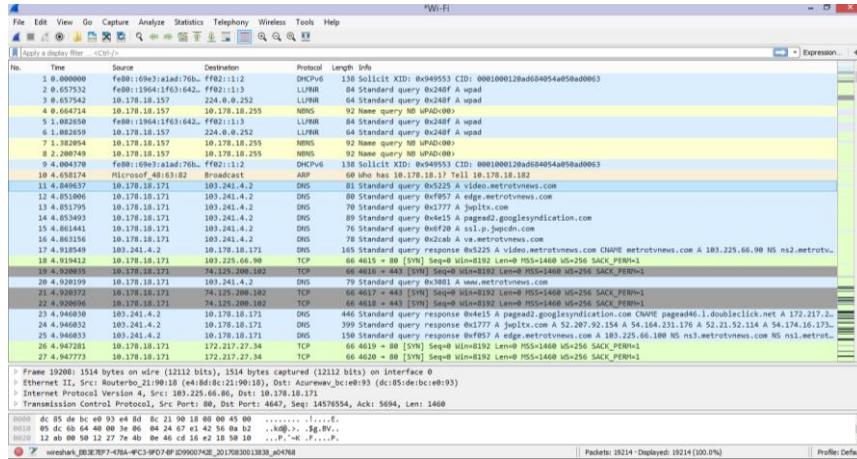
No.	Time	Source	Destination	Protocol	Length	Info
86	6.128370	10.178.18.171	45.114.118.200	TCP	55	[TCP segment of a reassembled PDU]
89	6.168519	10.178.18.171	45.114.118.200	TCP	55	[TCP segment of a reassembled PDU]
90	6.198270	10.178.18.171	45.114.118.200	TCP	55	[TCP segment of a reassembled PDU]
92	6.221987	10.178.18.171	45.114.118.200	TCP	55	[TCP segment of a reassembled PDU]
96	6.260489	10.178.18.171	31.13.78.42	TCP	55	[TCP segment of a reassembled PDU]
98	6.518515	10.178.18.171	74.125.200.156	TCP	55	[TCP segment of a reassembled PDU]
124	6.659011	10.178.18.171	74.125.200.156	TCP	55	[TCP segment of a reassembled PDU]
338	7.693227	10.178.18.171	31.13.78.35	TCP	55	[TCP segment of a reassembled PDU]
337	7.679579	10.178.18.171	74.125.24.95	TCP	55	[TCP segment of a reassembled PDU]
348	7.831890	10.178.18.171	74.125.24.154	TCP	55	[TCP segment of a reassembled PDU]
366	8.780287	10.178.18.171	74.125.24.149	TCP	55	[TCP segment of a reassembled PDU]
377	8.880459	10.178.18.171	74.125.24.132	TCP	55	[TCP segment of a reassembled PDU]
492	9.741683	10.178.18.171	13.112.100.219	TCP	55	[TCP segment of a reassembled PDU]
517	10.062168	10.178.18.171	74.125.24.156	TCP	55	[TCP segment of a reassembled PDU]
941	10.188579	10.178.18.171	74.125.24.149	TCP	55	[TCP segment of a reassembled PDU]
547	10.312766	10.178.18.171	172.217.26.66	TCP	55	[TCP segment of a reassembled PDU]
592	10.753727	10.178.18.171	172.217.27.98	TCP	55	[TCP segment of a reassembled PDU]
791	12.771708	10.178.18.171	23.0.189.82	TCP	55	[TCP segment of a reassembled PDU]
1032	14.865792	10.178.18.171	151.101.10.2	TCP	55	[TCP segment of a reassembled PDU]
1080	16.923818	10.178.18.171	23.200.178.99	TCP	55	[TCP segment of a reassembled PDU]
1128	18.335236	10.178.18.171	151.101.10.2	TCP	55	[TCP segment of a reassembled PDU]
1328	32.125116	10.178.18.171	23.0.189.82	TCP	55	[TCP segment of a reassembled PDU]
1329	32.125237	10.178.18.171	23.0.189.82	TCP	55	[TCP segment of a reassembled PDU]
1337	35.988773	10.178.18.171	23.192.114.232	TCP	55	[TCP segment of a reassembled PDU]
1358	35.988981	10.178.18.171	151.101.8.166	TCP	55	[TCP segment of a reassembled PDU]
1362	36.613049	10.178.18.171	23.0.181.109	TCP	55	[TCP segment of a reassembled PDU]

Capture beritateknologi.com

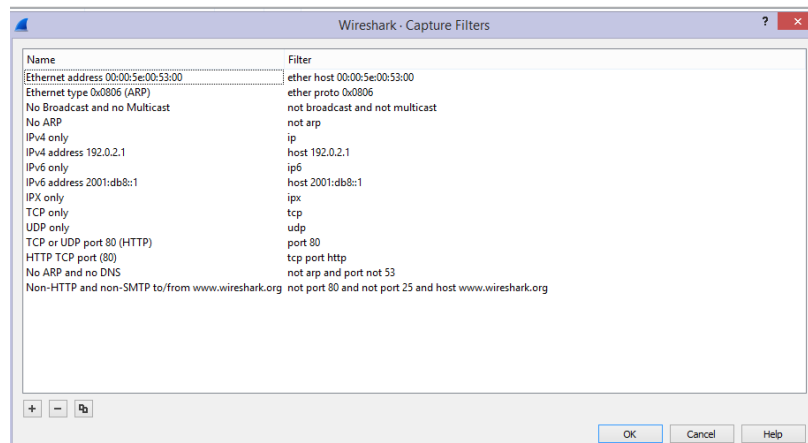
The screenshot shows the 'Wireshark - Capture Filters' dialog box. It contains a list of filters with their names and corresponding filter expressions. The filters are: Ethernet address 00:00:5e:00:53:00 (ether host 00:00:5e:00:53:00), Ethernet type 0x0806 (ARP) (ether proto 0x0806), No Broadcast and no Multicast (not broadcast and not multicast), No ARP (not arp), IPv4 only (ip), IPv4 address 192.0.2.1 (host 192.0.2.1), IPv6 only (ip6), IPv6 address 2001:db8::1 (host 2001:db8::1), IPX only (ipx), TCP only (tcp), UDP only (udp), TCP or UDP port 80 (HTTP) (port 80), HTTP TCP port (80) (tcp port http), No ARP and no DNS (not arp and port not 53), and Non-HTTP and non-SMTP to/from www.wireshark.org (not port 80 and not port 25 and host www.wireshark.org). The dialog has OK, Cancel, and Help buttons.

Name	Filter
Ethernet address 00:00:5e:00:53:00	ether host 00:00:5e:00:53:00
Ethernet type 0x0806 (ARP)	ether proto 0x0806
No Broadcast and no Multicast	not broadcast and not multicast
No ARP	not arp
IPv4 only	ip
IPv4 address 192.0.2.1	host 192.0.2.1
IPv6 only	ip6
IPv6 address 2001:db8::1	host 2001:db8::1
IPX only	ipx
TCP only	tcp
UDP only	udp
TCP or UDP port 80 (HTTP)	port 80
HTTP TCP port (80)	tcp port http
No ARP and no DNS	not arp and port not 53
Non-HTTP and non-SMTP to/from www.wireshark.org	not port 80 and not port 25 and host www.wireshark.org

2. Live streaming melalui www.video.metrotv.com
Selama 3 menit



Capture dari video.metrotv.com



3. Capture Menggunakan Command Prompt

- a. Saat mengakses beritateknologi.com

Waktu 3 menit

```
Command Prompt
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\pcc>netstat -a

Active Connections

Proto Local Address           Foreign Address         State
TCP 0.0.0.0:8135            komputer:0             LISTENING
TCP 0.0.0.0:445            komputer:0             LISTENING
TCP 0.0.0.0:1025          komputer:0             LISTENING
TCP 0.0.0.0:1026          komputer:0             LISTENING
TCP 0.0.0.0:1027          komputer:0             LISTENING
TCP 0.0.0.0:1028          komputer:0             LISTENING
TCP 0.0.0.0:1029          komputer:0             LISTENING
TCP 0.0.0.0:1030          komputer:0             LISTENING
TCP 0.0.0.0:1031          komputer:0             LISTENING
TCP 0.0.0.0:1032          komputer:0             LISTENING
TCP 0.0.0.0:5357         komputer:0             LISTENING
TCP 10.178.18.171:4329   komputer:0             LISTENING
TCP 10.178.18.171:4327   sa-in-f94:https        ESTABLISHED
TCP 10.178.18.171:4331   sa-in-f94:https        ESTABLISHED
TCP 10.178.18.171:4334   sa-in-f101:https       ESTABLISHED
TCP 10.178.18.171:4326   sa-in-f143:https       ESTABLISHED
TCP 10.178.18.171:4347   74.125.24.103:https    TIME_WAIT
TCP 10.178.18.171:4348   74.125.24.103:https    TIME_WAIT
TCP 10.178.18.171:4350   sc-in-f156:https       ESTABLISHED
TCP 10.178.18.171:4357   a23-492-201-19:https   ESTABLISHED
TCP 10.178.18.171:4359   sa-in-f139:https       ESTABLISHED
TCP 10.178.18.171:4363   xcf-fhcdn-shw-01-at13:https ESTABLISHED
TCP 10.178.18.171:4362   74.125.24.99:https     ESTABLISHED
TCP 10.178.18.171:4363   74.125.24.99:https     ESTABLISHED
TCP 10.178.18.171:4365   sa-in-f95:https        ESTABLISHED
TCP 10.178.18.171:4367   sa-in-f95:https        ESTABLISHED
TCP 10.178.18.171:4368   74.125.24.157:https    ESTABLISHED
TCP 10.178.18.171:4370   sa-in-f132:https       ESTABLISHED
TCP 10.178.18.171:4372   sa-in-f132:https       ESTABLISHED
TCP 10.178.18.171:4374   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4375   sa-in-f154:https       ESTABLISHED
TCP 10.178.18.171:4376   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4377   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4380   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4384   74.125.24.94:https     ESTABLISHED
TCP 10.178.18.171:4390   74.125.24.94:https     ESTABLISHED
TCP 10.178.18.171:4386   edge-star-mini-shw-01-sin6:https TIME_WAIT
TCP 10.178.18.171:4387   ec2-13-112-100-219:https TIME_WAIT
TCP 10.178.18.171:4392   xcf-fhcdn-shw-01-at13:https TIME_WAIT
TCP 10.178.18.171:4392   74.125.24.94:https     ESTABLISHED
TCP 10.178.18.171:4393   74.125.24.94:https     TIME_WAIT
TCP 10.178.18.171:4395   sc-in-f156:https       TIME_WAIT
TCP 10.178.18.171:4396   74.125.24.99:https     TIME_WAIT
TCP 10.178.18.171:4397   ams15s33-in-f3:https   ESTABLISHED
TCP 10.178.18.171:4411   74.125.24.103:https    ESTABLISHED
TCP 10.178.18.171:4412   45.114.118.200:https   ESTABLISHED
TCP 10.178.18.171:4413   45.114.118.200:https   ESTABLISHED
TCP 10.178.18.171:4414   45.114.118.200:https   ESTABLISHED
TCP 10.178.18.171:4415   45.114.118.200:https   ESTABLISHED
```

```
Command Prompt
TCP 10.178.18.171:4362   74.125.24.99:https     ESTABLISHED
TCP 10.178.18.171:4363   74.125.24.99:https     ESTABLISHED
TCP 10.178.18.171:4365   sa-in-f95:https        ESTABLISHED
TCP 10.178.18.171:4367   sa-in-f95:https        ESTABLISHED
TCP 10.178.18.171:4368   74.125.24.157:https    ESTABLISHED
TCP 10.178.18.171:4370   sa-in-f132:https       ESTABLISHED
TCP 10.178.18.171:4372   sa-in-f132:https       ESTABLISHED
TCP 10.178.18.171:4374   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4376   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4377   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4380   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4384   74.125.24.94:https     ESTABLISHED
TCP 10.178.18.171:4385   74.125.24.94:https     ESTABLISHED
TCP 10.178.18.171:4386   edge-star-mini-shw-01-sin6:https TIME_WAIT
TCP 10.178.18.171:4387   ec2-13-112-100-219:https TIME_WAIT
TCP 10.178.18.171:4390   xcf-fhcdn-shw-01-at13:https TIME_WAIT
TCP 10.178.18.171:4392   74.125.24.94:https     ESTABLISHED
TCP 10.178.18.171:4393   74.125.24.94:https     TIME_WAIT
TCP 10.178.18.171:4395   sc-in-f156:https       TIME_WAIT
TCP 10.178.18.171:4396   74.125.24.99:https     TIME_WAIT
TCP 10.178.18.171:4397   ams15s33-in-f3:https   ESTABLISHED
TCP 10.178.18.171:4411   74.125.24.103:https    ESTABLISHED
TCP 10.178.18.171:4412   45.114.118.200:https   ESTABLISHED
TCP 10.178.18.171:4413   45.114.118.200:https   ESTABLISHED
TCP 10.178.18.171:4414   45.114.118.200:https   ESTABLISHED
TCP 10.178.18.171:4415   45.114.118.200:https   ESTABLISHED
TCP 10.178.18.171:4417   45.114.118.200:https   ESTABLISHED
TCP 10.178.18.171:4418   182.161.72.66:https    ESTABLISHED
TCP 10.178.18.171:4419   182.161.72.66:https    ESTABLISHED
TCP 10.178.18.171:4420   182.161.72.66:https    ESTABLISHED
TCP 10.178.18.171:4421   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4422   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4423   202.232.230.37:https   ESTABLISHED
TCP 10.178.18.171:4424   202.232.230.37:https   ESTABLISHED
TCP 10.178.18.171:4425   202.232.230.37:https   ESTABLISHED
TCP 10.178.18.171:4427   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4428   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4429   sc-in-f155:https       ESTABLISHED
TCP 10.178.18.171:4430   ec2-13-112-100-219:https ESTABLISHED
TCP 10.178.18.171:4431   ec2-13-112-100-219:https ESTABLISHED
TCP 10.178.18.171:4432   ec2-13-112-100-219:https ESTABLISHED
TCP 10.178.18.171:4433   182.161.72.71:https    ESTABLISHED
TCP 10.178.18.171:4434   182.161.72.71:https    ESTABLISHED
TCP 10.178.18.171:4435   182.161.72.71:https    ESTABLISHED

C:\Users\pcc>_
```

b. Saat mengakses video.metrotv.com untuk melakukan video streaming.

```

Command Prompt
TCP 10.178.18.171:1461 server-54-230-156-60:https ESTABLISHED
TCP 10.178.18.171:1462 server-54-230-156-60:https TIME_WAIT
TCP 10.178.18.171:1463 server-54-230-156-60:https TIME_WAIT
TCP 10.178.18.171:1464 ec2-54-221-11-231:https TIME_WAIT
TCP 10.178.18.171:1465 xx-fbcdn-shv-01-ort2:https TIME_WAIT
TCP 10.178.18.171:1466 server-54-230-156-60:https TIME_WAIT
TCP 10.178.18.171:1473 74.125.24.138:https TIME_WAIT
TCP 10.178.18.171:1474 74.125.24.138:https TIME_WAIT
TCP 10.178.18.171:1475 74.125.24.138:https TIME_WAIT
TCP 10.178.18.171:1476 sc-in-f94:https ESTABLISHED
TCP 10.178.18.171:1480 74.125.24.74:https ESTABLISHED
TCP 10.178.18.171:1482 74.125.24.102:https ESTABLISHED
TCP 10.178.18.171:1484 74.125.24.102:https ESTABLISHED
TCP 10.178.18.171:1485 74.125.24.138:https ESTABLISHED
TCP 10.178.18.171:1486 13.107.4.50:https TIME_WAIT
TCP 10.178.18.171:1487 sc-in-f156:https ESTABLISHED
TCP 10.178.18.171:1490 46-1d:https TIME_WAIT
TCP 10.178.18.171:1491 edge-star-mini-shv-02-dft4:https ESTABLISHED
TCP 10.178.18.171:1492 edge-star-mini-shv-02-dft4:https TIME_WAIT
TCP 10.178.18.171:1493 74.125.24.25:https TIME_WAIT
TCP 10.178.18.171:1494 74.125.24.95:https TIME_WAIT
TCP 10.178.18.171:1495 edge-star-mini-shv-02-dft4:https ESTABLISHED
TCP 10.178.18.171:1496 113-125-232-198:https TIME_WAIT
TCP 10.178.18.171:1497 113-125-232-198:https TIME_WAIT
TCP 10.178.18.171:1498 113-125-232-198:https TIME_WAIT
TCP 10.178.18.171:1502 sc-in-f132:https ESTABLISHED
TCP 10.178.18.171:1503 sc-in-f132:https ESTABLISHED
TCP 10.178.18.171:1505 server-54-230-159-44:https ESTABLISHED
TCP 10.178.18.171:1505 server-54-230-159-44:https TIME_WAIT
TCP 10.178.18.171:1506 server-54-230-159-44:https ESTABLISHED
TCP 10.178.18.171:1507 113-125-232-198:https TIME_WAIT
TCP 10.178.18.171:1508 server-54-230-159-44:https TIME_WAIT
TCP 10.178.18.171:1509 74.125.24.155:https ESTABLISHED
TCP 10.178.18.171:1510 74.125.24.155:https ESTABLISHED
TCP 10.178.18.171:1511 sa-in-f155:https ESTABLISHED
TCP 10.178.18.171:1512 74.125.24.155:https ESTABLISHED
TCP 10.178.18.171:1513 74.125.24.155:https ESTABLISHED
TCP 10.178.18.171:1515 104.19.195.102:https ESTABLISHED
TCP 10.178.18.171:1516 74.125.24.139:https ESTABLISHED
TCP 10.178.18.171:1519 74.125.24.139:https ESTABLISHED
TCP 10.178.18.171:1520 13.107.4.50:https TIME_WAIT
TCP 10.178.18.171:1521 a-0901:https ESTABLISHED
TCP 10.178.18.171:1522 a-0901:https TIME_WAIT
TCP 10.178.18.171:1523 13.107.4.50:https TIME_WAIT
TCP 10.178.18.171:1524 a23-9-207-146:https ESTABLISHED
TCP 10.178.18.171:1525 sc-in-f154:https ESTABLISHED
TCP 10.178.18.171:1526 74.125.24.139:https ESTABLISHED
TCP 10.178.18.171:1528 ec2-54-249-8-56:https ESTABLISHED
TCP 10.178.18.171:1529 ec2-54-249-8-56:https ESTABLISHED
TCP 10.178.18.171:1530 ec2-54-249-8-56:https ESTABLISHED
TCP 10.178.18.171:1531 ec2-54-249-8-56:https ESTABLISHED
TCP 10.178.18.171:1532 13.107.4.50:https TIME_WAIT
TCP 10.178.18.171:1533 ec2-54-249-8-56:https TIME_WAIT
TCP 10.178.18.171:1534 74.125.24.102:https ESTABLISHED
TCP 10.178.18.171:1535 server-54-230-159-35:https ESTABLISHED
    
```

```

Command Prompt
TCP 10.178.18.171:2982 sa-in-f102:https ESTABLISHED
TCP 10.178.18.171:2983 sa-in-f102:https ESTABLISHED
TCP 10.178.18.171:2984 server-54-230-156-156:https TIME_WAIT
TCP 10.178.18.171:2985 server-54-230-156-156:https ESTABLISHED
TCP 10.178.18.171:2986 a45-121-219-209:https ESTABLISHED
TCP 10.178.18.171:2987 52-94-234-174:https ESTABLISHED
TCP 10.178.18.171:2988 52-94-234-174:https TIME_WAIT
TCP 10.178.18.171:2989 sc-in-f157:https ESTABLISHED
TCP 10.178.18.171:2990 sa-in-f94:https TIME_WAIT
TCP 10.178.18.171:2991 sa-in-f94:https TIME_WAIT
TCP 10.178.18.171:2992 sa-in-f94:https TIME_WAIT
TCP 10.178.18.171:2993 sa-in-f132:https TIME_WAIT
TCP 10.178.18.171:2994 sa-in-f132:https TIME_WAIT
TCP 10.178.18.171:2995 sa-in-f132:https TIME_WAIT
TCP 10.178.18.171:2996 sa-in-f132:https TIME_WAIT
TCP 10.178.18.171:2997 sa-in-f132:https TIME_WAIT
TCP 10.178.18.171:2998 74.125.24.106:https ESTABLISHED
TCP 10.178.18.171:2999 74.125.24.106:https TIME_WAIT
TCP 10.178.18.171:3000 server-54-230-15-104:https ESTABLISHED
TCP 10.178.18.171:3001 ip66-90:https TIME_WAIT
TCP 10.178.18.171:3002 ip66-90:https ESTABLISHED
TCP 10.178.18.171:3005 sc-in-f157:https TIME_WAIT
TCP 10.178.18.171:3007 103.235.46.26:https TIME_WAIT
TCP 10.178.18.171:3010 s1n1s03-in-f2:https ESTABLISHED
TCP 10.178.18.171:3013 104.193.88.105:https TIME_WAIT
TCP 127.0.0.1:2069 komputer:2920 TIME_WAIT
TCP :::1:135 komputer:0 LISTENING
TCP :::1:445 komputer:0 LISTENING
TCP :::1:1025 komputer:0 LISTENING
TCP :::1:1026 komputer:0 LISTENING
TCP :::1:1027 komputer:0 LISTENING
TCP :::1:1028 komputer:0 LISTENING
TCP :::1:1029 komputer:0 LISTENING
TCP :::1:1030 komputer:0 LISTENING
TCP :::1:1031 komputer:0 LISTENING
TCP :::1:2069 komputer:0 LISTENING
UDP 0.0.0.0:5000 **
UDP 0.0.0.0:4500 **
UDP 0.0.0.0:5355 **
UDP 0.0.0.0:49152 **
UDP 10.178.18.171:137 **
UDP 10.178.18.171:138 **
UDP 10.178.18.171:1900 **
UDP 10.178.18.171:52943 **
UDP 127.0.0.1:1900 **
UDP 127.0.0.1:49153 **
UDP 127.0.0.1:52944 **
UDP :::1:500 **
UDP :::1:4500 **
UDP :::1:5355 **
UDP :::1:1900 **
UDP :::1:152942 **
UDP ff80::69e3:a1ad:76b6:f002:1:546 **
UDP ff80::69e3:a1ad:76b6:f002:1:1900 **
UDP ff80::69e3:a1ad:76b6:f002:1:52941 **
    
```

C. Analisa

- a. Aplikasi yang digunakan adalah Wireshark 2.4.0 dan Command Prompt.
- b. Penjelasan frame-frame pada Wireshark
 - No yang mencantumkan nomor proses.
 - Time yang mencantumkan waktu proses.
 - Source yang mencantumkan nomor IP Address Source atau dari sumber.
 - Destination yang mencantumkan nomor IP Address Destination atau dari alamat tujuan.
 - Protocol adalah jenis protokol yang digunakan, dapat berupa TCP atau UDP.
 - Length yang mencantumkan besarnya header pada lapisan Network.
 - Info yang menjelaskan proses yang sedang terjadi
- c. Penjelasan frame-frame pada Command Prompt netstat -a
 - Proto mencantumkan protokol yang digunakan.
 - Local Address mencantumkan IP Adress Source
 - Foreign Address mencantumkan alamat yang dituju, dapat berupa IP Address Destination
 - State mencantumkan status dari koneksi yang terjadi tersebut, dapat berupa:
 - LISTENING : siap untuk melakukan koneksi
 - SYN_SENT -> mengirimkan paket SYN
 - SYN_RECEIVED -> menerima paket SYN
 - ESTABLISHED -> koneksi terjadi dan siap mengirimkan data
 - TIME_WAIT -> sedang menunggu koneksi

d. *IP Adress Source* (Sumber) dan *IP Adress Destination* (Tujuan)

A	B	C	D	E	F	G	H	I	
1	1	Wireshark 2.4.0	URL	Number	IP Adress Source	MAC Source	IP Adress Destination	MAC Destination	Info
2			beritateknologi.com	2	10.178.18.171	dc:85:de:bce0:93	207.46.140.205	e4:8d:8c:21:90:18	Seq=0 Win=8192 Len=0 MSS=1460 WS=256 SACK_PERM=1
3				1362	10.178.18.171	9c:d2:1e:aa:b2:07	23.0.181.109	dc:85:de:bce0:93	[TCP Segment of a reassembled PDU]
4									
5			video.metrotv.com	3	10.178.18.157	30:10:b3:7e:12:e1	244.0.0.252	dc:85:de:bce0:93	Standard query 0x248f A wpad
6				19201	10.178.18.171	dc:85:de:bce0:93	103.225.66.86	dc:85:de:bce0:93	[FIN, ACK] Seq=5694 Ack=14569254 Win=80128 Len=0
7				19208	103.225.66.86	e4:8d:8c:21:90:18	10.178.18.171	dc:85:de:bce0:93	[ACK] Seq=14576554 Ack=5694 Win=18816 Len=1460 [TCP segment of a reassembled PDU]
8									
9	2	Command Prompt	beritateknologi.com		10.178.18.171:139		komputer:0		LISTENING
10					10.178.18.171:4368		74.125.24.157		ESTABLISHED
11					10.178.18.171:4435		182.161.72.71:https		ESTABLISHED
12									
13			video.metrotv.com		10.178.18.171:2998		74.125.24.106:https		ESTABLISHED
14					10.178.18.171:3013		104.193.88.105		TIME WAIT

MAC address, merupakan singkatan dari “Media Access Control”, adalah sebuah identifikasi unik yang dimiliki oleh setiap network card komputer, atau switch, atau router, atau access point, atau apapun yang mungkin dihubungkan ke jaringan.