

8η Εργαστηριακή Άσκηση στα “Δίκτυα Υπολογιστών”
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1. TELNET

1.1) Χρησιμοποιεί ως πρωτόκολλο μεταφοράς το TCP.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	192.168.1.2	147.102.40.15	TCP	74	57366 → 23 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
2	0.100741017	147.102.40.15	192.168.1.2	TCP	74	23 → 57366 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
3	0.100794306	192.168.1.2	147.102.40.15	TCP	66	57366 → 23 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=2343057928...
4	0.100968140	192.168.1.2	147.102.40.15	TELNET	93	Telnet Data ...
5	0.204605738	147.102.40.15	192.168.1.2	TELNET	69	Telnet Data ...
6	0.204648550	192.168.1.2	147.102.40.15	TCP	66	57366 → 23 [ACK] Seq=28 Ack=4 Win=64256 Len=0 TSval=234305803...

1.2) Οι θύρες του πρωτοκόλλου μεταφοράς που χρησιμοποιούνται για την επικοινωνία είναι οι θύρες 57366 και 23.

192.168.1.2 ⇒ 147.102.40.15 :

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	192.168.1.2	147.102.40.15	TCP	74	57366 → 23 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
2	0.100741017	147.102.40.15	192.168.1.2	TCP	74	23 → 57366 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
3	0.100794306	192.168.1.2	147.102.40.15	TCP	66	57366 → 23 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=2343057928...
4	0.100968140	192.168.1.2	147.102.40.15	TELNET	93	Telnet Data ...
5	0.204605738	147.102.40.15	192.168.1.2	TELNET	69	Telnet Data ...
6	0.204648550	192.168.1.2	147.102.40.15	TCP	66	57366 → 23 [ACK] Seq=28 Ack=4 Win=64256 Len=0 TSval=234305803...

Frame 1: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface wlo1, id 0
Ethernet II, Src: 00:e9:3a:0b:f3 (00:e9:3a:0b:f3), Dst: 04:71:53:ad:2e:60 (04:71:53:ad:2e:60)
Internet Protocol Version 4, Src: 192.168.1.2, Dst: 147.102.40.15
Transmission Control Protocol, Src Port: 57366, Dst Port: 23, Seq: 0, Len: 0
Source Port: 57366
Destination Port: 23
[Stream index: 0]
TCP Segment Len: 0

147.102.40.15 ⇒ 192.168.1.2

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	192.168.1.2	147.102.40.15	TCP	74	57366 → 23 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
2	0.100741017	147.102.40.15	192.168.1.2	TCP	74	23 → 57366 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
3	0.100794306	192.168.1.2	147.102.40.15	TCP	66	57366 → 23 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=2343057928...
4	0.100968140	192.168.1.2	147.102.40.15	TELNET	93	Telnet Data ...
5	0.204605738	147.102.40.15	192.168.1.2	TELNET	69	Telnet Data ...
6	0.204648550	192.168.1.2	147.102.40.15	TCP	66	57366 → 23 [ACK] Seq=28 Ack=4 Win=64256 Len=0 TSval=234305803...

Frame 2: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface wlo1, id 0
Ethernet II, Src: 04:71:53:ad:2e:60 (04:71:53:ad:2e:60), Dst: 00:e9:3a:0b:f3 (00:e9:3a:0b:f3)
Internet Protocol Version 4, Src: 147.102.40.15, Dst: 192.168.1.2
Transmission Control Protocol, Src Port: 23, Dst Port: 57366, Seq: 0, Ack: 1, Len: 0
Source Port: 23
Destination Port: 57366
[Stream index: 0]
TCP Segment Len: 0

1.3) Στο πρωτόκολλο εφαρμογής TELNET αντιστοιχεί η θύρα 23.

1.4) Η σύνταξη του φίλτρου απεικόνισης που χρησιμοποίησα είναι η εξής: telnet

No.	Time	Source	Destination	Protocol	Length	Info
4	0.100968140	192.168.1.2	147.102.40.15	TELNET	93	Telnet Data ...
5	0.204605738	147.102.40.15	192.168.1.2	TELNET	69	Telnet Data ...
7	0.204740391	192.168.1.2	147.102.40.15	TELNET	69	Telnet Data ...
8	0.216738218	147.102.40.15	192.168.1.2	TELNET	93	Telnet Data ...
10	0.306550081	147.102.40.15	192.168.1.2	TELNET	72	Telnet Data ...
11	0.306587338	192.168.1.2	147.102.40.15	TELNET	123	Telnet Data ...

1.5) 147.102.40.15 ⇒ 192.168.1.2: Do Echo

No.	Time	Source	Destination	Protocol	Length	Info
16	0.519467614	192.168.1.2	147.102.40.15	TELNET	150	Telnet Data ...
17	0.613737174	147.102.40.15	192.168.1.2	TELNET	69	Telnet Data ...
18	0.613887961	192.168.1.2	147.102.40.15	TELNET	69	Telnet Data ...
19	0.625291092	147.102.40.15	192.168.1.2	TELNET	84	Telnet Data ...
20	0.625550132	192.168.1.2	147.102.40.15	TELNET	72	Telnet Data ...
21	0.716098988	147.102.40.15	192.168.1.2	TELNET	159	Telnet Data ...

Frame 17: 69 bytes on wire (552 bits), 69 bytes captured (552 bits) on interface wlo1, id 0
Ethernet II, Src: 04:71:53:ad:2e:60 (04:71:53:ad:2e:60), Dst: 00:e9:3a:0b:f3 (00:e9:3a:0b:f3)
Internet Protocol Version 4, Src: 147.102.40.15, Dst: 192.168.1.2
Transmission Control Protocol, Src Port: 23, Dst Port: 57366, Seq: 61, Ack: 178, Len: 3
Telnet
Do Echo

192.168.1.2 ⇒ 147.102.40.15: Won't Echo

No.	Time	Source	Destination	Protocol	Length	Info
✓ 16	0.519467614	192.168.1.2	147.102.40.15	TELNET	150	Telnet Data ...
✓ 17	0.613737174	147.102.40.15	192.168.1.2	TELNET	69	Telnet Data ...
✓ 18	0.613887961	192.168.1.2	147.102.40.15	TELNET	69	Telnet Data ...
✓ 19	0.625291092	147.102.40.15	192.168.1.2	TELNET	84	Telnet Data ...
✓ 20	0.625550132	192.168.1.2	147.102.40.15	TELNET	72	Telnet Data ...
✓ 21	0.716098988	147.102.40.15	192.168.1.2	TELNET	159	Telnet Data ...
▶ Frame 18: 69 bytes on wire (552 bits), 69 bytes captured (552 bits) on interface wlo1, id 0 ▶ Ethernet II, Src: 00:e9:3a:0b:0b:f3 (00:e9:3a:0b:0b:f3), Dst: 04:71:53:ad:2e:60 (04:71:53:ad:2e:60) ▶ Internet Protocol Version 4, Src: 192.168.1.2, Dst: 147.102.40.15 ▶ Transmission Control Protocol, Src Port: 57366, Dst Port: 23, Seq: 178, Ack: 64, Len: 3 ▼ Telnet ▶ Won't Echo						

147.102.40.15 ⇒ 192.168.1.2: Will Echo

No.	Time	Source	Destination	Protocol	Length	Info
✓ 16	0.519467614	192.168.1.2	147.102.40.15	TELNET	150	Telnet Data ...
✓ 17	0.613737174	147.102.40.15	192.168.1.2	TELNET	69	Telnet Data ...
✓ 18	0.613887961	192.168.1.2	147.102.40.15	TELNET	69	Telnet Data ...
✓ 19	0.625291092	147.102.40.15	192.168.1.2	TELNET	84	Telnet Data ...
✓ 20	0.625550132	192.168.1.2	147.102.40.15	TELNET	72	Telnet Data ...
✓ 21	0.716098988	147.102.40.15	192.168.1.2	TELNET	159	Telnet Data ...
▶ Frame 19: 84 bytes on wire (672 bits), 84 bytes captured (672 bits) on interface wlo1, id 0 ▶ Ethernet II, Src: 04:71:53:ad:2e:60 (04:71:53:ad:2e:60), Dst: 00:e9:3a:0b:0b:f3 (00:e9:3a:0b:0b:f3) ▶ Internet Protocol Version 4, Src: 147.102.40.15, Dst: 192.168.1.2 ▶ Transmission Control Protocol, Src Port: 23, Dst Port: 57366, Seq: 64, Ack: 181, Len: 18 ▼ Telnet ▶ Will Echo ▶ Suboption Remote Flow Control						

192.168.1.2 ⇒ 147.102.40.15: Do Echo

No.	Time	Source	Destination	Protocol	Length	Info
✓ 16	0.519467614	192.168.1.2	147.102.40.15	TELNET	150	Telnet Data ...
✓ 17	0.613737174	147.102.40.15	192.168.1.2	TELNET	69	Telnet Data ...
✓ 18	0.613887961	192.168.1.2	147.102.40.15	TELNET	69	Telnet Data ...
✓ 19	0.625291092	147.102.40.15	192.168.1.2	TELNET	84	Telnet Data ...
✓ 20	0.625550132	192.168.1.2	147.102.40.15	TELNET	72	Telnet Data ...
✓ 21	0.716098988	147.102.40.15	192.168.1.2	TELNET	159	Telnet Data ...
▶ Frame 20: 72 bytes on wire (576 bits), 72 bytes captured (576 bits) on interface wlo1, id 0 ▶ Ethernet II, Src: 00:e9:3a:0b:0b:f3 (00:e9:3a:0b:0b:f3), Dst: 04:71:53:ad:2e:60 (04:71:53:ad:2e:60) ▶ Internet Protocol Version 4, Src: 192.168.1.2, Dst: 147.102.40.15 ▶ Transmission Control Protocol, Src Port: 57366, Dst Port: 23, Seq: 181, Ack: 82, Len: 6 ▼ Telnet ▶ Do Echo ▶ Won't Linemode						

1.6) Ναι ο edu-dy.cn.ntua.gr ζητάει από τον υπολογιστή μου να επαναλάβει τους χαρακτήρες που λαμβάνει, αλλά ο υπολογιστής μου δεν το κάνει.

147.102.40.15 ⇒ 192.168.1.2: Do Echo

No.	Time	Source	Destination	Protocol	Length	Info
✓ 16	0.519467614	192.168.1.2	147.102.40.15	TELNET	150	Telnet Data ...
✓ 17	0.613737174	147.102.40.15	192.168.1.2	TELNET	69	Telnet Data ...
✓ 18	0.613887961	192.168.1.2	147.102.40.15	TELNET	69	Telnet Data ...
✓ 19	0.625291092	147.102.40.15	192.168.1.2	TELNET	84	Telnet Data ...
✓ 20	0.625550132	192.168.1.2	147.102.40.15	TELNET	72	Telnet Data ...
✓ 21	0.716098988	147.102.40.15	192.168.1.2	TELNET	159	Telnet Data ...
▶ Frame 17: 69 bytes on wire (552 bits), 69 bytes captured (552 bits) on interface wlo1, id 0 ▶ Ethernet II, Src: 04:71:53:ad:2e:60 (04:71:53:ad:2e:60), Dst: 00:e9:3a:0b:0b:f3 (00:e9:3a:0b:0b:f3) ▶ Internet Protocol Version 4, Src: 147.102.40.15, Dst: 192.168.1.2 ▶ Transmission Control Protocol, Src Port: 23, Dst Port: 57366, Seq: 61, Ack: 178, Len: 3 ▼ Telnet ▶ Do Echo						

192.168.1.2 ⇒ 147.102.40.15: Won't Echo

No.	Time	Source	Destination	Protocol	Length	Info
✓ 16	0.519467614	192.168.1.2	147.102.40.15	TELNET	150	Telnet Data ...
✓ 17	0.613737174	147.102.40.15	192.168.1.2	TELNET	69	Telnet Data ...
✓ 18	0.613887961	192.168.1.2	147.102.40.15	TELNET	69	Telnet Data ...
✓ 19	0.625291092	147.102.40.15	192.168.1.2	TELNET	84	Telnet Data ...
✓ 20	0.625550132	192.168.1.2	147.102.40.15	TELNET	72	Telnet Data ...
✓ 21	0.716098988	147.102.40.15	192.168.1.2	TELNET	159	Telnet Data ...
▶ Frame 18: 69 bytes on wire (552 bits), 69 bytes captured (552 bits) on interface wlo1, id 0 ▶ Ethernet II, Src: 00:e9:3a:0b:0b:f3 (00:e9:3a:0b:0b:f3), Dst: 04:71:53:ad:2e:60 (04:71:53:ad:2e:60) ▶ Internet Protocol Version 4, Src: 192.168.1.2, Dst: 147.102.40.15 ▶ Transmission Control Protocol, Src Port: 57366, Dst Port: 23, Seq: 178, Ack: 64, Len: 3 ▼ Telnet ▶ Won't Echo						

1.7) Όχι δεν ζητάει ο edu-dy.cn.ntua.gr από τον υπολογιστή μου να μην επαναλάβει τους χαρακτήρες που λαμβάνει, καθώς δεν υπάρχει αίτημα της μορφής Don't Echo.

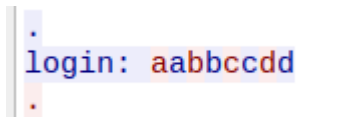
1.8) Ναι προτίθεται να τους επαναλάβει.

147.102.40.15 ⇒ 192.168.1.2: Will Echo

1.9) Ναι έχει προηγηθεί.

[illegible]

1.10) Παρατηρώ ότι ο server edu-dy.cn.ntua.gr επαναλαμβάνει κάθε γράμμα που πληκτρολογώ.



1.11) Το φαινόμενο που συμβαίνει είναι αναμενόμενο, καθώς ο υπολογιστής μου πριν έχει ζητήσει από τον server edu-dy.cn.ntua.gr να τα επαναλάβει.

1.12) Η σύνταξη του φίλτρου απεικόνισης που χρησιμοποίησα είναι η εξής:
telnet and ip.src == 192.168.1.2

No.	Time	Source	Destination	Protocol	Length	Info
4	0.100968140	192.168.1.2	147.102.40.15	TELNET	93	Telnet Data ...
7	0.204740391	192.168.1.2	147.102.40.15	TELNET	69	Telnet Data ...
11	0.306587338	192.168.1.2	147.102.40.15	TELNET	123	Telnet Data ...
13	0.507915582	192.168.1.2	147.102.40.15	TELNET	72	Telnet Data ...
16	0.519467614	192.168.1.2	147.102.40.15	TELNET	150	Telnet Data ...
18	0.613887961	192.168.1.2	147.102.40.15	TELNET	69	Telnet Data ...

1.13) Χρειάστηκαν 5 πακέτα, ένα πακέτο για κάθε γράμμα συν ένα ακόμα πακέτο για τον χαρακτήρα Enter.

[illegible]

No.	Time	Source	Destination	Protocol	Length	Info
35	3.662523960	192.168.1.2	147.102.40.15	TELNET	68	Telnet Data ...
40	4.836159922	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
42	5.261230514	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
44	5.564120473	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
46	5.859552473	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
48	6.266313918	192.168.1.2	147.102.40.15	TELNET	68	Telnet Data ...
▶ Frame 42: 67 bytes on wire (536 bits), 67 bytes captured (536 bits) on interface wlo1, id 0 ▶ Ethernet II, Src: 00:e9:3a:0b:0b:f3 (00:e9:3a:0b:0b:f3), Dst: 04:71:53:ad:2e:60 (04:71:53:ad:2e:60) ▶ Internet Protocol Version 4, Src: 192.168.1.2, Dst: 147.102.40.15 ▶ Transmission Control Protocol, Src Port: 57366, Dst Port: 23, Seq: 194, Ack: 223, Len: 1 ▼ Telnet Data: f						

No.	Time	Source	Destination	Protocol	Length	Info
35	3.662523060	192.168.1.2	147.102.40.15	TELNET	68	Telnet Data ...
40	4.836159922	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
42	5.261230514	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
44	5.564120473	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
46	5.859552473	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
48	6.266313018	192.168.1.2	147.102.40.15	TELNET	68	Telnet Data ...
▶ Frame 44: 67 bytes on wire (536 bits), 67 bytes captured (536 bits) on interface wlo1, id 0 ▶ Ethernet II, Src: 00:e9:3a:0b:0b:f3 (00:e9:3a:0b:0b:f3), Dst: 04:71:53:ad:2e:60 (04:71:53:ad:2e:60) ▶ Internet Protocol Version 4, Src: 192.168.1.2, Dst: 147.102.40.15 ▶ Transmission Control Protocol, Src Port: 57366, Dst Port: 23, Seq: 195, Ack: 223, Len: 1 ▼ Telnet Data: g						
No.	Time	Source	Destination	Protocol	Length	Info
35	3.662523060	192.168.1.2	147.102.40.15	TELNET	68	Telnet Data ...
40	4.836159922	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
42	5.261230514	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
44	5.564120473	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
46	5.859552473	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
48	6.266313018	192.168.1.2	147.102.40.15	TELNET	68	Telnet Data ...
▶ Frame 46: 67 bytes on wire (536 bits), 67 bytes captured (536 bits) on interface wlo1, id 0 ▶ Ethernet II, Src: 00:e9:3a:0b:0b:f3 (00:e9:3a:0b:0b:f3), Dst: 04:71:53:ad:2e:60 (04:71:53:ad:2e:60) ▶ Internet Protocol Version 4, Src: 192.168.1.2, Dst: 147.102.40.15 ▶ Transmission Control Protocol, Src Port: 57366, Dst Port: 23, Seq: 196, Ack: 223, Len: 1 ▼ Telnet Data: h						
No.	Time	Source	Destination	Protocol	Length	Info
35	3.662523060	192.168.1.2	147.102.40.15	TELNET	68	Telnet Data ...
40	4.836159922	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
42	5.261230514	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
44	5.564120473	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
46	5.859552473	192.168.1.2	147.102.40.15	TELNET	67	Telnet Data ...
48	6.266313018	192.168.1.2	147.102.40.15	TELNET	68	Telnet Data ...
▶ Frame 48: 68 bytes on wire (544 bits), 68 bytes captured (544 bits) on interface wlo1, id 0 ▶ Ethernet II, Src: 00:e9:3a:0b:0b:f3 (00:e9:3a:0b:0b:f3), Dst: 04:71:53:ad:2e:60 (04:71:53:ad:2e:60) ▶ Internet Protocol Version 4, Src: 192.168.1.2, Dst: 147.102.40.15 ▶ Transmission Control Protocol, Src Port: 57366, Dst Port: 23, Seq: 197, Ack: 223, Len: 2 ▼ Telnet Data: \r						

1.15) Όχι, ο εξυπηρετητής δεν στέλνει την ηχώ των χαρακτήρων efgh του κωδικού χρήστη προς τον πελάτη.

1.16) Όχι, δεν παρατηρώ εντολή Don't Echo πριν την μεταφορά του κωδικού.

1.17) Για λόγους ασφαλείας, το TELNET δεν επαναλαμβάνει τον κωδικό του χρήστη.

1.18) Από ότι παρατήρησα η ασφάλεια που παρέχει η υπηρεσία Telnet είναι σχεδόν μηδενική, καθώς η συνομιλία μεταξύ των δύο άκρων - συσκευών μπορεί να γίνει εύκολα προσβάσιμη από κάποιον τρίτο, ο οποίος μπορεί να υποκλέψει ευαίσθητα στοιχεία.

2. FTP

2.1) Η σύνταξη του φίλτρου σύλληψης που χρησιμοποίησα είναι η εξής:
host 147.102.40.15

2.2) Το flag -d σημαίνει ότι είναι σε debug mode.



2.3) Χρησιμοποιεί πρωτόκολλο μεταφοράς TCP.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	147.102.131.97	147.102.40.15	TCP	60	58694 → 21 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
2	0.018301582	147.102.40.15	147.102.131.97	TCP	60	21 → 58694 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
3	0.018390138	147.102.131.97	147.102.40.15	TCP	52	58694 → 21 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=277775559...
4	0.053694229	147.102.40.15	147.102.131.97	FTP	126	Response: 220 ProFTPD 1.3.4a Server (ProFTPD Default Installa...
5	0.053773566	147.102.131.97	147.102.40.15	TCP	52	58694 → 21 [ACK] Seq=1 Ack=75 Win=64256 Len=0 TSval=277775559...
6	3.989357935	147.102.131.97	147.102.40.15	FTP	68	Request: USER anonymous

2.4) Για τις εντολές ελέγχου ισχύει:

Θύρα πηγής: 58694

No.	Time	Source	Destination	Protocol	Length	Info
+	1 0.000000000	147.102.131.97	147.102.40.15	TCP	60	58694 → 21 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
	2 0.018301582	147.102.40.15	147.102.131.97	TCP	60	21 → 58694 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
	40 24.954723271	147.102.40.15	147.102.131.97	TCP	60	20 → 48471 [SYN] Seq=0 Win=65535 Len=0 MSS=536 WS=64 SACK_PER...
	41 24.954793459	147.102.131.97	147.102.40.15	TCP	60	48471 → 20 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SA...
Transmission Control Protocol, Src Port: 58694, Dst Port: 21, Seq: 0, Len: 0						
Source Port: 58694						
Destination Port: 21						
[Stream index: 0]						
[TCP Segment Len: 0]						
Sequence number: 0 (relative sequence number)						
Sequence number (raw): 3613853321						
[Next sequence number: 1 (relative sequence number)]						

Θύρα προορισμού: 21

No.	Time	Source	Destination	Protocol	Length	Info
+	1 0.000000000	147.102.131.97	147.102.40.15	TCP	60	58694 → 21 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
	2 0.018301582	147.102.40.15	147.102.131.97	TCP	60	21 → 58694 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
	40 24.954723271	147.102.40.15	147.102.131.97	TCP	60	20 → 48471 [SYN] Seq=0 Win=65535 Len=0 MSS=536 WS=64 SACK_PER...
	41 24.954793459	147.102.131.97	147.102.40.15	TCP	60	48471 → 20 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SA...
Transmission Control Protocol, Src Port: 58694, Dst Port: 21, Seq: 0, Len: 0						
Source Port: 58694						
Destination Port: 21						
[Stream index: 0]						
[TCP Segment Len: 0]						
Sequence number: 0 (relative sequence number)						
Sequence number (raw): 3613853321						
[Next sequence number: 1 (relative sequence number)]						

Για την μεταφορά δεδομένων:

Θύρα πηγής: 48471

No.	Time	Source	Destination	Protocol	Length	Info
	1 0.000000000	147.102.131.97	147.102.40.15	TCP	60	58694 → 21 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
	2 0.018301582	147.102.40.15	147.102.131.97	TCP	60	21 → 58694 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
	40 24.954723271	147.102.40.15	147.102.131.97	TCP	60	20 → 48471 [SYN] Seq=0 Win=65535 Len=0 MSS=536 WS=64 SACK_PER...
	41 24.954793459	147.102.131.97	147.102.40.15	TCP	60	48471 → 20 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SA...
Transmission Control Protocol, Src Port: 48471, Dst Port: 20, Seq: 0, Ack: 1, Len: 0						
Source Port: 48471						
Destination Port: 20						
[Stream index: 1]						
[TCP Segment Len: 0]						
Sequence number: 0 (relative sequence number)						
Sequence number (raw): 2127823508						
[Next sequence number: 1 (relative sequence number)]						

Θύρα προορισμού: 20

No.	Time	Source	Destination	Protocol	Length	Info
	1 0.000000000	147.102.131.97	147.102.40.15	TCP	60	58694 → 21 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
	2 0.018301582	147.102.40.15	147.102.131.97	TCP	60	21 → 58694 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
	40 24.954723271	147.102.40.15	147.102.131.97	TCP	60	20 → 48471 [SYN] Seq=0 Win=65535 Len=0 MSS=536 WS=64 SACK_PER...
	41 24.954793459	147.102.131.97	147.102.40.15	TCP	60	48471 → 20 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SA...
Transmission Control Protocol, Src Port: 48471, Dst Port: 20, Seq: 0, Ack: 1, Len: 0						
Source Port: 48471						
Destination Port: 20						
[Stream index: 1]						
[TCP Segment Len: 0]						
Sequence number: 0 (relative sequence number)						
Sequence number (raw): 2127823508						
[Next sequence number: 1 (relative sequence number)]						

2.5) Η σύνδεση TCP για την μεταφορά δεδομένων FTP γίνεται από την πλευρά του εξυπηρετητή.

2.6) Request command: USER

No.	Time	Source	Destination	Protocol	Length	Info
	6 3.989357935	147.102.131.97	147.102.40.15	FTP	68	Request: USER anonymous
	9 14.767182116	147.102.131.97	147.102.40.15	FTP	69	Request: PASS labuser@cn
	12 14.783493016	147.102.131.97	147.102.40.15	FTP	58	Request: SYST
	16 22.294611437	147.102.131.97	147.102.40.15	FTP	58	Request: HELP
	36 24.750036760	147.102.131.97	147.102.40.15	FTP	80	Request: PORT 147,102,131,97,189,87
	39 24.772182015	147.102.131.97	147.102.40.15	FTP	58	Request: LIST
[Timestamps]						
TCP payload (16 bytes)						
File Transfer Protocol (FTP)						
USER anonymous\r\n						
Request command: USER						
Request arg: anonymous						
[Current working directory:]						

Request command: PASS

No.	Time	Source	Destination	Protocol	Length	Info
6	3.989357935	147.102.131.97	147.102.40.15	FTP	68	Request: USER anonymous
9	14.767182116	147.102.131.97	147.102.40.15	FTP	69	Request: PASS labuser@cn
12	14.783493016	147.102.131.97	147.102.40.15	FTP	58	Request: SYST
16	22.294611437	147.102.131.97	147.102.40.15	FTP	58	Request: HELP
36	24.750036760	147.102.131.97	147.102.40.15	FTP	80	Request: PORT 147,102,131,97,189,87
39	24.772182015	147.102.131.97	147.102.40.15	FTP	58	Request: LIST
▶ [Timestamps] TCP payload (17 bytes) ▾ File Transfer Protocol (FTP) ▾ PASS labuser@cn\r\n Request command: PASS Request arg: labuser@cn [Current working directory:]						

Request command: SYST

No.	Time	Source	Destination	Protocol	Length	Info
6	3.989357935	147.102.131.97	147.102.40.15	FTP	68	Request: USER anonymous
9	14.767182116	147.102.131.97	147.102.40.15	FTP	69	Request: PASS labuser@cn
12	14.783493016	147.102.131.97	147.102.40.15	FTP	58	Request: SYST
16	22.294611437	147.102.131.97	147.102.40.15	FTP	58	Request: HELP
36	24.750036760	147.102.131.97	147.102.40.15	FTP	80	Request: PORT 147,102,131,97,189,87
39	24.772182015	147.102.131.97	147.102.40.15	FTP	58	Request: LIST
▶ [SEQ/ACK analysis] ▶ [Timestamps] TCP payload (6 bytes) ▾ File Transfer Protocol (FTP) ▾ SYST\r\n Request command: SYST [Current working directory:]						

Request command: HELP

No.	Time	Source	Destination	Protocol	Length	Info
6	3.989357935	147.102.131.97	147.102.40.15	FTP	68	Request: USER anonymous
9	14.767182116	147.102.131.97	147.102.40.15	FTP	69	Request: PASS labuser@cn
12	14.783493016	147.102.131.97	147.102.40.15	FTP	58	Request: SYST
16	22.294611437	147.102.131.97	147.102.40.15	FTP	58	Request: HELP
36	24.750036760	147.102.131.97	147.102.40.15	FTP	80	Request: PORT 147,102,131,97,189,87
39	24.772182015	147.102.131.97	147.102.40.15	FTP	58	Request: LIST
▶ [SEQ/ACK analysis] ▶ [Timestamps] TCP payload (6 bytes) ▾ File Transfer Protocol (FTP) ▾ HELP\r\n Request command: HELP [Current working directory:]						

Request command: PORT

No.	Time	Source	Destination	Protocol	Length	Info
6	3.989357935	147.102.131.97	147.102.40.15	FTP	68	Request: USER anonymous
9	14.767182116	147.102.131.97	147.102.40.15	FTP	69	Request: PASS labuser@cn
12	14.783493016	147.102.131.97	147.102.40.15	FTP	58	Request: SYST
16	22.294611437	147.102.131.97	147.102.40.15	FTP	58	Request: HELP
36	24.750036760	147.102.131.97	147.102.40.15	FTP	80	Request: PORT 147,102,131,97,189,87
39	24.772182015	147.102.131.97	147.102.40.15	FTP	58	Request: LIST
▶ [SEQ/ACK analysis] ▶ [Timestamps] TCP payload (28 bytes) ▾ File Transfer Protocol (FTP) ▾ PORT 147,102,131,97,189,87\r\n Request command: PORT Request arg: 147,102,131,97,189,87 Active IP address: 147.102.131.97						

Request command: LIST

No.	Time	Source	Destination	Protocol	Length	Info
6	3.989357935	147.102.131.97	147.102.40.15	FTP	68	Request: USER anonymous
9	14.767182116	147.102.131.97	147.102.40.15	FTP	69	Request: PASS labuser@cn
12	14.783493016	147.102.131.97	147.102.40.15	FTP	58	Request: SYST
16	22.294611437	147.102.131.97	147.102.40.15	FTP	58	Request: HELP
36	24.750036760	147.102.131.97	147.102.40.15	FTP	80	Request: PORT 147,102,131,97,189,87
39	24.772182015	147.102.131.97	147.102.40.15	FTP	58	Request: LIST
▶ [SEQ/ACK analysis] ▶ [Timestamps] TCP payload (6 bytes) ▾ File Transfer Protocol (FTP) ▾ LIST\r\n Request command: LIST [Current working directory:] Command response: 227						

Request command: QUIT

No.	Time	Source	Destination	Protocol	Length	Info
9	14.767182116	147.102.131.97	147.102.40.15	FTP	69	Request: PASS labuser@cn
12	14.783493016	147.102.131.97	147.102.40.15	FTP	58	Request: SYST
16	22.294611437	147.102.131.97	147.102.40.15	FTP	58	Request: HELP
36	24.750036760	147.102.131.97	147.102.40.15	FTP	80	Request: PORT 147,102,131,97,189,87
39	24.772182015	147.102.131.97	147.102.40.15	FTP	58	Request: LIST
52	28.042011554	147.102.131.97	147.102.40.15	FTP	58	Request: QUIT

▶ [SEQ/ACK analysis]
 ▶ [Timestamps]
 TCP payload (6 bytes)
 File Transfer Protocol (FTP)
 QUIT\r\n
 Request command: QUIT
 [Current working directory:]

2.7) Ναι, και εμφανίζονται ως εξής:

- --- > USER
- --- > PASS XXXX
- --- > SYST
- --- > HELP
- --- > PORT 147, 102, 131, 97, 189, 87
- --- > LIST
- --- > QUIT

2.8) Μεταφέρεται με την εντολή USER.

2.9) Χρειάζεται μόνο ένα πακέτο για να μεταφερθεί το όνομα χρήστη.

No.	Time	Source	Destination	Protocol	Length	Info
6	3.989357935	147.102.131.97	147.102.40.15	FTP	68	Request: USER anonymous
9	14.767182116	147.102.131.97	147.102.40.15	FTP	69	Request: PASS labuser@cn
12	14.783493016	147.102.131.97	147.102.40.15	FTP	58	Request: SYST
16	22.294611437	147.102.131.97	147.102.40.15	FTP	58	Request: HELP
36	24.750036760	147.102.131.97	147.102.40.15	FTP	80	Request: PORT 147,102,131,97,189,87
39	24.772182015	147.102.131.97	147.102.40.15	FTP	58	Request: LIST

▶ Frame 6: 68 bytes on wire (544 bits), 68 bytes captured (544 bits) on interface tun0, id 0
 Raw packet data
 ▶ Internet Protocol Version 4, Src: 147.102.131.97, Dst: 147.102.40.15
 ▶ Transmission Control Protocol, Src Port: 58694, Dst Port: 21, Seq: 1, Ack: 75, Len: 16
 ▶ File Transfer Protocol (FTP)
 [Current working directory:]

2.10) Μεταφέρεται με την εντολή PASS.

2.11) Χρειάζεται μόνο ένα πακέτο για να μεταφερθεί ο κωδικός του χρήστη.

No.	Time	Source	Destination	Protocol	Length	Info
6	3.989357935	147.102.131.97	147.102.40.15	FTP	68	Request: USER anonymous
9	14.767182116	147.102.131.97	147.102.40.15	FTP	69	Request: PASS labuser@cn
12	14.783493016	147.102.131.97	147.102.40.15	FTP	58	Request: SYST
16	22.294611437	147.102.131.97	147.102.40.15	FTP	58	Request: HELP
36	24.750036760	147.102.131.97	147.102.40.15	FTP	80	Request: PORT 147,102,131,97,189,87
39	24.772182015	147.102.131.97	147.102.40.15	FTP	58	Request: LIST

▶ Frame 9: 69 bytes on wire (552 bits), 69 bytes captured (552 bits) on interface tun0, id 0
 Raw packet data
 ▶ Internet Protocol Version 4, Src: 147.102.131.97, Dst: 147.102.40.15
 ▶ Transmission Control Protocol, Src Port: 58694, Dst Port: 21, Seq: 17, Ack: 150, Len: 17
 ▶ File Transfer Protocol (FTP)
 [Current working directory:]

2.12) Μία ομοιότητα μεταξύ των δύο είναι ότι κανένα από τα δύο δεν χρησιμοποιεί κρυπτογράφηση. Μία διαφορά είναι ότι, στην περίπτωση του Telnet στέλνετε κάθε χαρακτήρας ξεχωριστά, ενώ στην περίπτωση του FTP στέλνονται όλοι μαζί σε ένα πακέτο.

2.13) Όχι, δεν μεταφράζεται.

2.14) Δύο εντολές είναι οι εξής: CCC, CONF.

2.15) Από τον υπολογιστή μου στάλθηκε μόνο ένα πακέτο.

No.	Time	Source	Destination	Protocol	Length	Info
16	22.294611437	147.102.131.97	147.102.40.15	FTP	58	Request: HELP

Από τον εξυπηρετητή στάλθηκαν 9 πακέτα.

No.	Time	Source	Destination	Protocol	Length	Info
18	22.383362232	147.102.40.15	147.102.131.97	FTP	119	Response: 214-The following commands are recognized (* =>'s u...
20	22.383424249	147.102.40.15	147.102.131.97	FTP	122	Response: 214-CWD XCWD CDUP XCUP SMNT* QUIT ...
22	22.383440940	147.102.40.15	147.102.131.97	FTP	122	Response: 214-EPRD EPSV ALLO* RNFR RNTD DELE ...
24	22.383455257	147.102.40.15	147.102.131.97	FTP	122	Response: 214-XRMD MKD XMKD PWD XPWD SIZE ...
26	22.383470063	147.102.40.15	147.102.131.97	FTP	122	Response: 214-NOOP FEAT OPTS AUTH* CCC* CONF* ...
28	22.383484310	147.102.40.15	147.102.131.97	FTP	122	Response: 214-PBSZ* PROT* TYPE STRU MODE RETR ...
30	22.383503865	147.102.40.15	147.102.131.97	FTP	122	Response: 214-APPE REST ABOR USER PASS ACCT* ...
31	22.383512385	147.102.40.15	147.102.131.97	FTP	98	Response: 214-NLST STAT SITE MLSD MLST
32	22.383522093	147.102.40.15	147.102.131.97	FTP	103	Response: 214 Direct comments to root@edu-dy.cn.ece.ntua.gr

2.16) Δηλώνεται με τον να μην βάλει ο εξυπηρετητής “-” (hyphen) στην αρχή της γραμμής.

2.17) Παριστάνουν την IPv4 που χρησιμοποιεί ο υπολογιστής μου.

147.102.131.97

Request: PORT 147,102,131,97,

2.18) Προκύπτει αν πολλαπλασιαστεί το πέμπτο (5ο) byte με τον αριθμό 256 και προστεθεί το αποτέλεσμα στο έκτο (6ο) byte.

2.19) Η εντολή LIST.

2.20) Αυτό συμβαίνει, καθώς γίνεται σύναψη νέας σύνδεσης, μέσω της τριμερούς χειραψίας με την θύρα δεδομένων.

2.21) Μεταφράζεται στην εντολή QUIT.

2.22) Αποκρίνεται με το μήνυμα “221 Goodbye”.

No.	Time	Source	Destination	Protocol	Length	Info
37	24.772027951	147.102.40.15	147.102.131.97	FTP	81	Response: 200 PORT command successful
39	24.772182015	147.102.131.97	147.102.40.15	FTP	58	Request: LIST
43	25.054610253	147.102.40.15	147.102.131.97	FTP	106	Response: 150 Opening ASCII mode data connection for file list
50	25.352788657	147.102.40.15	147.102.131.97	FTP	75	Response: 226 Transfer complete
52	28.042011554	147.102.131.97	147.102.40.15	FTP	58	Request: QUIT
53	28.116984657	147.102.40.15	147.102.131.97	FTP	66	Response: 221 Goodbye.

2.23) Η σύνταξη του φίλτρου απεικόνισης που χρησιμοποιήσα είναι η εξής:

tcp.flags.fin == 1

No.	Time	Source	Destination	Protocol	Length	Info
47	25.054708447	147.102.40.15	147.102.131.97	FTP-DA...	554	FTP Data: 502 bytes (PORT) (LIST)
48	25.054974534	147.102.131.97	147.102.40.15	TCP	52	48471 → 20 [FIN, ACK] Seq=1 Ack=1028 Win=64256 Len=0 TSval=27...
55	28.117399362	147.102.131.97	147.102.40.15	TCP	52	58694 → 21 [FIN, ACK] Seq=86 Ack=923 Win=64256 Len=0 TSval=27...
56	28.128119163	147.102.40.15	147.102.131.97	TCP	52	21 → 58694 [FIN, ACK] Seq=923 Ack=86 Win=65984 Len=0 TSval=99...
58	28.334364986	147.102.40.15	147.102.131.97	TCP	52	[TCP Retransmission] 21 → 58694 [FIN, ACK] Seq=923 Ack=87 Win...

2.24) Η απόλυση των συνδέσεων γίνεται από την πλευρά του πελάτη, τόσο για τις εντολές ελέγχου, όσο και για τα μηνύματα δεδομένων.

2.25) Για τις εντολές ελέγχου:

Θύρα πηγής: 44780

No.	Time	Source	Destination	Protocol	Length	Info
4	11.965313723	147.102.131.21	147.102.40.15	TCP	60	44780 → 21 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
5	11.968260730	147.102.40.15	147.102.131.21	TCP	60	21 → 44780 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
53	20.307551753	147.102.131.21	147.102.40.15	TCP	60	59903 → 32118 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 SACK_PERM=...
55	20.519584631	147.102.40.15	147.102.131.21	TCP	60	32118 → 59903 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 ...
Transmission Control Protocol, Src Port: 44780, Dst Port: 21, Seq: 0, Len: 0						
Source Port: 44780						
Destination Port: 21						
[Stream index: 1]						
[TCP Segment Len: 0]						
Sequence number: 0 (relative sequence number)						
Sequence number (raw): 280835983						
[Next sequence number: 1 (relative sequence number)]						

Θύρα προορισμού: 21

No.	Time	Source	Destination	Protocol	Length	Info
4	11.965313723	147.102.131.21	147.102.40.15	TCP	60	44780 → 21 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
5	11.968260730	147.102.40.15	147.102.131.21	TCP	60	21 → 44780 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
53	20.307551753	147.102.131.21	147.102.40.15	TCP	60	59903 → 32118 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 SACK_PERM=...
55	20.519584631	147.102.40.15	147.102.131.21	TCP	60	32118 → 59903 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 ...

Transmission Control Protocol, Src Port: 44780, Dst Port: 21, Seq: 0, Len: 0

Source Port: 44780

Destination Port: 21

[Stream index: 1]

[TCP Segment Len: 0]

Sequence number: 0 (relative sequence number)

Sequence number (raw): 200835983

[Next sequence number: 1 (relative sequence number)]

Για την μεταφορά δεδομένων:

Θύρα πηγής: 59903

No.	Time	Source	Destination	Protocol	Length	Info
4	11.965313723	147.102.131.21	147.102.40.15	TCP	60	44780 → 21 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
5	11.968260730	147.102.40.15	147.102.131.21	TCP	60	21 → 44780 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
53	20.307551753	147.102.131.21	147.102.40.15	TCP	60	59903 → 32118 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 SACK_PERM=...
55	20.519584631	147.102.40.15	147.102.131.21	TCP	60	32118 → 59903 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 ...

Transmission Control Protocol, Src Port: 59903, Dst Port: 32118, Seq: 0, Len: 0

Source Port: 59903

Destination Port: 32118

[Stream index: 2]

[TCP Segment Len: 0]

Sequence number: 0 (relative sequence number)

Sequence number (raw): 209015045

[Next sequence number: 1 (relative sequence number)]

Θύρα προορισμού: 32118

No.	Time	Source	Destination	Protocol	Length	Info
4	11.965313723	147.102.131.21	147.102.40.15	TCP	60	44780 → 21 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
5	11.968260730	147.102.40.15	147.102.131.21	TCP	60	21 → 44780 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
53	20.307551753	147.102.131.21	147.102.40.15	TCP	60	59903 → 32118 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 SACK_PERM=...
55	20.519584631	147.102.40.15	147.102.131.21	TCP	60	32118 → 59903 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 ...

Transmission Control Protocol, Src Port: 59903, Dst Port: 32118, Seq: 0, Len: 0

Source Port: 59903

Destination Port: 32118

[Stream index: 2]

[TCP Segment Len: 0]

Sequence number: 0 (relative sequence number)

Sequence number (raw): 209015045

[Next sequence number: 1 (relative sequence number)]

2.26) Οι εντολές FTP είναι οι εξής:

1.) AUTH

No.	Time	Source	Destination	Protocol	Length	Info
16	8.402911227	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH TLS
19	8.582631803	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH SSL
22	8.791340081	147.102.131.21	147.102.40.15	FTP	68	Request: USER anonymous
25	9.196163227	147.102.131.21	147.102.40.15	FTP	80	Request: PASS anonymous@example.com
28	9.447044335	147.102.131.21	147.102.40.15	FTP	58	Request: SYST
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT

Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15

Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 1, Ack: 75, Len: 10

File Transfer Protocol (FTP)

AUTH TLS\r\n

Request command: AUTH

Request arg: TLS

[Current working directory:]

No.	Time	Source	Destination	Protocol	Length	Info
16	8.402911227	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH TLS
19	8.582631803	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH SSL
22	8.791340081	147.102.131.21	147.102.40.15	FTP	68	Request: USER anonymous
25	9.196163227	147.102.131.21	147.102.40.15	FTP	80	Request: PASS anonymous@example.com
28	9.447044335	147.102.131.21	147.102.40.15	FTP	58	Request: SYST
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT

Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15

Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 11, Ack: 100, Len: 10

File Transfer Protocol (FTP)

AUTH SSL\r\n

Request command: AUTH

Request arg: SSL

[Current working directory:]

2.) USER

No.	Time	Source	Destination	Protocol	Length	Info
16	8.402911227	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH TLS
19	8.582631803	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH SSL
22	8.791340081	147.102.131.21	147.102.40.15	FTP	68	Request: USER anonymous
25	9.196163227	147.102.131.21	147.102.40.15	FTP	80	Request: PASS anonymous@example.com
28	9.447044335	147.102.131.21	147.102.40.15	FTP	58	Request: SYST
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT
Raw packet data						
Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15						
Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 21, Ack: 125, Len: 16						
File Transfer Protocol (FTP)						
USER anonymous\r\n						
Request command: USER						
Request arg: anonymous						
[Current working directory:]						

3.) PASS

No.	Time	Source	Destination	Protocol	Length	Info
16	8.402911227	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH TLS
19	8.582631803	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH SSL
22	8.791340081	147.102.131.21	147.102.40.15	FTP	68	Request: USER anonymous
25	9.196163227	147.102.131.21	147.102.40.15	FTP	80	Request: PASS anonymous@example.com
28	9.447044335	147.102.131.21	147.102.40.15	FTP	58	Request: SYST
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT
Raw packet data						
Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15						
Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 37, Ack: 200, Len: 28						
File Transfer Protocol (FTP)						
PASS anonymous@example.com\r\n						
Request command: PASS						
Request arg: anonymous@example.com						
[Current working directory:]						

4.) SYST

No.	Time	Source	Destination	Protocol	Length	Info
16	8.402911227	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH TLS
19	8.582631803	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH SSL
22	8.791340081	147.102.131.21	147.102.40.15	FTP	68	Request: USER anonymous
25	9.196163227	147.102.131.21	147.102.40.15	FTP	80	Request: PASS anonymous@example.com
28	9.447044335	147.102.131.21	147.102.40.15	FTP	58	Request: SYST
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT
Raw packet data						
Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15						
Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 65, Ack: 250, Len: 6						
File Transfer Protocol (FTP)						
SYST\r\n						
Request command: SYST						
[Current working directory:]						

5.) FEAT

No.	Time	Source	Destination	Protocol	Length	Info
16	8.402911227	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH TLS
19	8.582631803	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH SSL
22	8.791340081	147.102.131.21	147.102.40.15	FTP	68	Request: USER anonymous
25	9.196163227	147.102.131.21	147.102.40.15	FTP	80	Request: PASS anonymous@example.com
28	9.447044335	147.102.131.21	147.102.40.15	FTP	58	Request: SYST
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT
Raw packet data						
Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15						
Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 71, Ack: 269, Len: 6						
File Transfer Protocol (FTP)						
FEAT\r\n						
Request command: FEAT						
[Current working directory:]						

6.) OPTS

No.	Time	Source	Destination	Protocol	Length	Info
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT
34	9.477497890	147.102.131.21	147.102.40.15	FTP	66	Request: OPTS UTF8 ON
36	9.611852038	147.102.131.21	147.102.40.15	FTP	57	Request: PWD
38	9.618819077	147.102.131.21	147.102.40.15	FTP	60	Request: TYPE I
40	9.624722142	147.102.131.21	147.102.40.15	FTP	58	Request: PASV
42	9.629066565	147.102.131.21	147.102.40.15	FTP	58	Request: MLSD
Raw packet data						
Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15						
Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 77, Ack: 624, Len: 14						
File Transfer Protocol (FTP)						
OPTS UTF8 ON\r\n						
Request command: OPTS						
Request arg: UTF8 ON						
[Current working directory:]						

7.) PWD

No.	Time	Source	Destination	Protocol	Length	Info
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT
34	9.477497890	147.102.131.21	147.102.40.15	FTP	66	Request: OPTS UTF8 ON
36	9.611852938	147.102.131.21	147.102.40.15	FTP	57	Request: PWD
38	9.618819077	147.102.131.21	147.102.40.15	FTP	60	Request: TYPE I
40	9.624722142	147.102.131.21	147.102.40.15	FTP	58	Request: PASV
42	9.629066565	147.102.131.21	147.102.40.15	FTP	58	Request: MLSD

Raw packet data

- Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15
- Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 91, Ack: 644, Len: 5
- File Transfer Protocol (FTP)
 - PWD\r\n

Request command: PWD

[Current working directory:]

8.) TYPE

No.	Time	Source	Destination	Protocol	Length	Info
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT
34	9.477497890	147.102.131.21	147.102.40.15	FTP	66	Request: OPTS UTF8 ON
36	9.611852938	147.102.131.21	147.102.40.15	FTP	57	Request: PWD
38	9.618819077	147.102.131.21	147.102.40.15	FTP	60	Request: TYPE I
40	9.624722142	147.102.131.21	147.102.40.15	FTP	58	Request: PASV
42	9.629066565	147.102.131.21	147.102.40.15	FTP	58	Request: MLSD

Raw packet data

- Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15
- Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 96, Ack: 678, Len: 8
- File Transfer Protocol (FTP)
 - TYPE I\r\n

Request command: TYPE

Request arg: I

[Current working directory: /]

9.) PASV

No.	Time	Source	Destination	Protocol	Length	Info
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT
34	9.477497890	147.102.131.21	147.102.40.15	FTP	66	Request: OPTS UTF8 ON
36	9.611852938	147.102.131.21	147.102.40.15	FTP	57	Request: PWD
38	9.618819077	147.102.131.21	147.102.40.15	FTP	60	Request: TYPE I
40	9.624722142	147.102.131.21	147.102.40.15	FTP	58	Request: PASV
42	9.629066565	147.102.131.21	147.102.40.15	FTP	58	Request: MLSD

Raw packet data

- Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15
- Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 104, Ack: 697, Len: 6
- File Transfer Protocol (FTP)
 - PASV\r\n

Request command: PASV

[Current working directory: /]

10.) MLSD

No.	Time	Source	Destination	Protocol	Length	Info
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT
34	9.477497890	147.102.131.21	147.102.40.15	FTP	66	Request: OPTS UTF8 ON
36	9.611852938	147.102.131.21	147.102.40.15	FTP	57	Request: PWD
38	9.618819077	147.102.131.21	147.102.40.15	FTP	60	Request: TYPE I
40	9.624722142	147.102.131.21	147.102.40.15	FTP	58	Request: PASV
42	9.629066565	147.102.131.21	147.102.40.15	FTP	58	Request: MLSD

Raw packet data

- Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15
- Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 110, Ack: 748, Len: 6
- File Transfer Protocol (FTP)
 - MLSD\r\n

Request command: MLSD

[Current working directory: /]

[Command response frames: 7]

2.27) Χρησιμοποιήθηκε ως όνομα χρήστη το “anonymous” και ως κωδικός χρήστη χρησιμοποιήθηκε το “anonymous@example.com”

No.	Time	Source	Destination	Protocol	Length	Info
16	8.402911227	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH TLS
19	8.582631803	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH SSL
22	8.791340081	147.102.131.21	147.102.40.15	FTP	68	Request: USER anonymous
25	9.196163227	147.102.131.21	147.102.40.15	FTP	80	Request: PASS anonymous@example.com
28	9.447044335	147.102.131.21	147.102.40.15	FTP	58	Request: SYST
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT

Raw packet data

- Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15
- Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 21, Ack: 125, Len: 16
- File Transfer Protocol (FTP)
 - USER anonymous\r\n

Request command: USER

Request arg: anonymous

[Current working directory:]

No.	Time	Source	Destination	Protocol	Length	Info
16	8.402911227	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH TLS
19	8.582631803	147.102.131.21	147.102.40.15	FTP	62	Request: AUTH SSL
22	8.791340081	147.102.131.21	147.102.40.15	FTP	68	Request: USER anonymous
25	9.196163227	147.102.131.21	147.102.40.15	FTP	80	Request: PASS anonymous@example.com
28	9.447044335	147.102.131.21	147.102.40.15	FTP	58	Request: SYST
30	9.451102919	147.102.131.21	147.102.40.15	FTP	58	Request: FEAT
▶ Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15 ▶ Transmission Control Protocol, Src Port: 45652, Dst Port: 21, Seq: 37, Ack: 200, Len: 28 ▶ File Transfer Protocol (FTP) ▶ PASS anonymous@example.com\r\n Request command: PASS Request arg: anonymous@example.com [Current working directory:]						

2.28) Χρησιμοποιήθηκε η εντολή MLSD.

2.29) Το μήνυμα με το οποίο αποκρίνεται ο εξυπηρετητής στην εντολή PASV είναι το εξής:
227 Entering Passive Mode (147, 102, 40, 15, 252, 46).

No.	Time	Source	Destination	Protocol	Length	Info
39	9.624539774	147.102.40.15	147.102.131.21	FTP	71	Response: 200 Type set to I
40	9.624722142	147.102.131.21	147.102.40.15	FTP	58	Request: PASV
41	9.628505848	147.102.40.15	147.102.131.21	FTP	103	Response: 227 Entering Passive Mode (147,102,40,15,252,46).
42	9.629066565	147.102.131.21	147.102.40.15	FTP	58	Request: MLSD
47	9.816445387	147.102.40.15	147.102.131.21	FTP	101	Response: 150 Opening ASCII mode data connection for MLSD
65	10.203487281	147.102.40.15	147.102.131.21	FTP	75	Response: 226 Transfer complete

2.30) Η εγκατάσταση της σύνδεσης TCP, που αφορά τα μηνύματα δεδομένων του FTP γίνεται από την πλευρά του υπολογιστή μου.

2.31) Χρησιμοποιεί την θύρα 64558, και αυτό προκύπτει, καθώς $(252 * 256) + 46 = 64558$.

No.	Time	Source	Destination	Protocol	Length	Info
6	7.763899040	45.155.205.175	147.102.131.21	TCP	40	48160 → 20921 [SYN] Seq=0 Win=1024 Len=0
11	8.391965958	147.102.131.21	147.102.40.15	TCP	60	45652 → 21 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 T...
12	8.395086461	147.102.40.15	147.102.131.21	TCP	60	21 → 45652 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 WS=...
43	9.629133945	147.102.131.21	147.102.40.15	TCP	60	45951 → 64558 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 SACK_PERM=...
45	9.812283820	147.102.40.15	147.102.131.21	TCP	60	64558 → 45951 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=536 ...
69	12.217903990	91.214.124.39	147.102.131.21	TCP	40	51356 → 5495 [SYN] Seq=0 Win=65535 Len=0
▶ Transmission Control Protocol, Src Port: 64558, Dst Port: 45951, Seq: 0, Ack: 1, Len: 0 Source Port: 64558 Destination Port: 45951 [Stream index: 3] [TCP Segment Len: 0] Sequence number: 0 (relative sequence number) Sequence number (raw): 3269593012 (Next sequence number: 0 (relative sequence number))						

2.32) Προκύπτει με τυχαίο τρόπο, απλά είναι διαθέσιμη.

2.33) Στάλθηκαν 7 τέτοια μηνύματα. Τα πρώτα 6 είχαν μέγεθος δεδομένων ίσο με 524 bytes και το τελευταίο είχε μέγεθος δεδομένων ίσο με 179 bytes.

No.	Time	Source	Destination	Protocol	Length	Info
48	9.819855911	147.102.40.15	147.102.131.21	FTP-DA...	576	FTP Data: 524 bytes (PASV) (MLSD)
50	9.819913860	147.102.40.15	147.102.131.21	FTP-DA...	576	FTP Data: 524 bytes (PASV) (MLSD)
52	9.819935225	147.102.40.15	147.102.131.21	FTP-DA...	576	FTP Data: 524 bytes (PASV) (MLSD)
53	9.819950585	147.102.40.15	147.102.131.21	FTP-DA...	576	FTP Data: 524 bytes (PASV) (MLSD)
56	9.824256120	147.102.40.15	147.102.131.21	FTP-DA...	576	FTP Data: 524 bytes (PASV) (MLSD)
58	9.824316513	147.102.40.15	147.102.131.21	FTP-DA...	576	FTP Data: 524 bytes (PASV) (MLSD)
60	9.824334177	147.102.40.15	147.102.131.21	FTP-DA...	231	FTP Data: 179 bytes (PASV) (MLSD)

2.34) Ουσιαστικά περιέχει ονομαστικά τα περιεχόμενα του απομακρυσμένου υπολογιστή.

2.35) Η απόλυση των συνδέσεων TCP, που αφορούν τις εντολές ελέγχου του FTP γίνεται από την πλευρά του εξυπηρετητή.

2.36) Η απόλυση της σύνδεσης TCP, που αφορά τα μηνύματα δεδομένων FTP γίνεται από την πλευρά του υπολογιστή μου (πελάτη).

3 TFTP

3.1) Χρησιμοποιεί το πρωτόκολλο UDP.

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183029702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925205	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3
▶ Frame 63: 51 bytes on wire (408 bits), 51 bytes captured (408 bits) on interface tun0, id 0 Raw packet data ▶ Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15 ▶ User Datagram Protocol, Src Port: 56659, Dst Port: 69 ▶ Trivial File Transfer Protocol						

3.2) Θύρα πηγής: 56659

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183029702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925205	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3
▶ Frame 63: 51 bytes on wire (408 bits), 51 bytes captured (408 bits) on interface tun0, id 0 Raw packet data ▶ Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15 ▶ User Datagram Protocol, Src Port: 56659, Dst Port: 69 Source Port: 56659 Destination Port: 69 Length: 31 Checksum: 0x651d [unverified]						

Θύρα προορισμού: 69

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183029702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925205	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3
▶ Frame 63: 51 bytes on wire (408 bits), 51 bytes captured (408 bits) on interface tun0, id 0 Raw packet data ▶ Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15 ▶ User Datagram Protocol, Src Port: 56659, Dst Port: 69 Source Port: 56659 Destination Port: 69 Length: 31 Checksum: 0x651d [unverified]						

3.3) Θύρα πηγής: 56659

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183029702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925205	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3
▶ User Datagram Protocol, Src Port: 56659, Dst Port: 19674 Source Port: 56659 Destination Port: 19674 Length: 12 Checksum: 0x03b2 [unverified] [Checksum Status: Unverified] [Stream index: 2]						

Θύρα προορισμού: 19674

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183029702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925205	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3
▶ User Datagram Protocol, Src Port: 56659, Dst Port: 19674 Source Port: 56659 Destination Port: 19674 Length: 12 Checksum: 0x03b2 [unverified] [Checksum Status: Unverified] [Stream index: 2]						

3.4) Αντιστοιχεί η θύρα 69.

3.5) Προκύπτουν τυχαία, ανάλογα την διαθεσιμότητα των θυρών που υπάρχουν.

3.6) Με ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183829702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925295	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3

Raw packet data
Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15
User Datagram Protocol, Src Port: 56659, Dst Port: 69
Trivial File Transfer Protocol
Opcode: Read Request (1)
Source File: rfc1350.txt
Type: netascii

3.7) Καθορίζεται στο πρώτο μήνυμα που στέλνει ο πελάτης (147.102.131.21) στον εξυπηρετητή (147.102.40.15), πιο συγκεκριμένα καθορίζεται στο πεδίο Type, με την τιμή netascii.

3.8) Τύποι μηνυμάτων TFTP που κατέγραψα:

α.) Read Request

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183829702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925295	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3

Raw packet data
Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15
User Datagram Protocol, Src Port: 56659, Dst Port: 69
Trivial File Transfer Protocol
Opcode: Read Request (1)
Source File: rfc1350.txt
Type: netascii

β.) Data Packet

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183829702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925295	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3

Raw packet data
Internet Protocol Version 4, Src: 147.102.40.15, Dst: 147.102.131.21
User Datagram Protocol, Src Port: 19674, Dst Port: 56659
Trivial File Transfer Protocol
Opcode: Data Packet (3)
[Source File: rfc1350.txt]
Block: 1
[Full Block Number: 1]

γ.) Acknowledgement

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183829702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925295	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3

Raw packet data
Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15
User Datagram Protocol, Src Port: 56659, Dst Port: 19674
Trivial File Transfer Protocol
Opcode: Acknowledgement (4)
[Source File: rfc1350.txt]
Block: 1
[Full Block Number: 1]

3.9) Τα πακέτα χωρίζονται με έναν αριθμό Block, και για κάθε ένα πακέτο που στέλνει ο εξυπηρετητής, ο πελάτης απαντάει σε αυτό με ένα μήνυμα του τύπου Acknowledgement που έχει τον αντίστοιχο αριθμό Block.

3.10) Ο τύπος Acknowledgement στο πεδίο Opcode.

π.χ

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183829702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925205	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3
Raw packet data						
Internet Protocol Version 4, Src: 147.102.131.21, Dst: 147.102.40.15						
User Datagram Protocol, Src Port: 56659, Dst Port: 19674						
Trivial File Transfer Protocol						
Opcode: Acknowledgement (4)						
[Source File: rfc1350.txt]						
Block: 1						
[Full Block Number: 1]						

3.11) Ολόκληρο το μήνυμα TFTP έχει μέγεθος ίσο με 516 bytes.

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183829702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925205	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3
Frame 64: 544 bytes on wire (4352 bits), 544 bytes captured (4352 bits) on interface tun0, id 0						
Raw packet data						
Internet Protocol Version 4, Src: 147.102.40.15, Dst: 147.102.131.21						
User Datagram Protocol, Src Port: 19674, Dst Port: 56659						
Trivial File Transfer Protocol						
Data (512 bytes)						
0000	45 00 02 20 80 01 00 00	3e 11 28 db 93 66 28 0f	E...>.(.f(. ..f..L..S...o...			
0010	93 66 83 15 4c da dd 53	02 0c f3 6f 00 03 00 01Netw ork Work ing Grou			
0020	0d 0a 0d 0a 0d 0a 0d 0a	0d 0a 0d 0a 4e 65 74 77	p			
0030	6f 72 6b 20 5f 6f 72 6b	69 6e 67 20 47 72 6f 75	K. Sol			
0040	70 20 20 20 20 20 20 20	20 20 20 20 20 20 20 20	lins..Re quest Fo			
0050	20 20 20 20 20 20 20 20	20 20 20 20 20 20 20 20	r Commen ts: 1350			
0060	20 20 20 20 20 20 20 20	20 20 4b 2e 20 53 6f 6c	MIT..			
0070	6c 69 6e 73 0d 0a 52 65	71 75 65 73 74 20 46 6f	STD: 33			
0080	72 20 43 6f 6d 65 6e 74	73 3a 20 31 33 35 36	J			
0090	20 20 20 20 20 20 20 20	20 20 20 20 20 20 20 20	ates: RFC 783....			
00a0	20 20 20 20 20 20 20 20	20 20 20 20 20 20 20 20	..			
00b0	20 20 20 20 20 20 20 20	20 20 20 4d 49 54 0d 0a	T HE TFTP			
00c0	53 54 44 3a 20 33 33 20	20 20 20 20 20 20 20 20	PROTOCOL (REVISI			
00d0	20 20 20 20 20 20 20 20	20 20 20 20 20 20 20 20	ON 2)...Status			
00e0	20 20 20 20 20 20 20 20	20 20 20 20 20 20 20 20	of this Memo....			
00f0	20 20 20 20 20 20 20 20	20 20 20 20 20 20 20 4a	This RFC spec			
0100	75 6c 79 20 31 39 39 32	0d 0a 4f 62 73 6f 6c 65	ifies an IAB sta			
0110	74 65 73 3a 20 52 46 43	20 37 38 33 0d 0a 0d 0a	ndards t rack pro			
0120	0d 0a 20 20 20 20 20 20	20 20 20 20 20 20 20 20	tocol fo r the In			
0130	20 20 20 20 20 20 20 54	48 45 20 54 46 54 50 20	ternet.. commu			
0140	50 52 4f 54 4f 43 4f 4c	20 28 52 45 56 49 53 49	nity, an d reques			
0150	4f 4e 20 32 29 0d 0a 0d	0a 53 74 61 74 75 73 20	ts discu ssion an			
0160	6f 66 20 74 68 69 73 20	4d 65 6d 6f 0d 0a 0d 0a	d sugges tions fo			
0170	20 20 20 54 68 69 73 20	52 46 43 20 73 70 65 63	r improv ements..			
0180	69 66 69 65 73 20 61 6e	20 49 41 42 20 73 74 61	. Plea se refer			
0190	6e 64 61 72 64 73 20 74	72 61 63 6b 20 70 72 6f	to the current			
01a0	74 6f 63 6f 6c 20 66 6f	72 20 74 68 65 20 49 6e				
01b0	74 65 72 6e 65 74 0d 0a	20 20 20 63 6f 6d 6d 75				
01c0	6e 69 74 79 2c 20 61 6e	64 20 72 65 71 75 65 73				
01d0	74 73 20 64 69 73 63 75	73 73 69 6f 6e 20 61 6e				
01e0	64 20 73 75 67 67 65 73	74 69 6f 6e 73 20 66 6f				
01f0	72 20 69 6d 70 72 6f 76	65 6d 65 6e 74 73 2e 0d				
0200	0a 20 20 20 50 6c 65 61	73 65 20 72 65 66 65 72				
0210	20 74 6f 20 74 68 65 20	63 75 72 72 65 6e 74 20				

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183029702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925205	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3
▶ Frame 64: 544 bytes on wire (4352 bits), 544 bytes captured (4352 bits) on interface tun0, id 0 Raw packet data ▶ Internet Protocol Version 4, Src: 147.102.40.15, Dst: 147.102.131.21 ▶ User Datagram Protocol, Src Port: 19674, Dst Port: 56659 ▶ Trivial File Transfer Protocol ▶ Data (512 bytes)						
0000 45 00 02 20 80 01 00 00 3e 11 28 db 93 66 28 0f E...>...f(. 0010 93 66 83 15 4c da dd 53 02 0c f3 6f 00 03 00 01 f...L..S...o... 0020 0d 0a 0d 0a 0d 0a 0d 0a 0d 0a 0d 0a 4e 65 74 77Netw 0030 6f 72 6b 20 57 6f 72 6b 69 6e 67 20 47 72 6f 75 ork Work ing Grou 0040 70 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 p 0050 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 0060 20 20 20 20 20 20 20 20 20 20 4b 2e 20 53 6f 6c K. Sol 0070 6c 69 6e 73 0d 0a 52 65 71 75 65 73 74 20 46 6f lins..Re quest Fo 0080 72 20 43 6f 6d 65 6e 74 73 3a 20 31 33 35 36 r Commen ts: 1350 0090 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00a0 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00b0 20 20 20 20 20 20 20 20 20 20 20 4d 49 54 0d 0a MIT.. 00c0 53 54 44 3a 20 33 33 20 20 20 20 20 20 20 20 20 STD: 33 00d0 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00e0 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00f0 20 20 20 20 20 20 20 20 20 20 20 20 20 20 4a J 0100 75 6c 79 20 31 39 39 32 0d 0a 4f 62 73 6f 6c 65 uly 1992 ..Obsole 0110 74 65 73 3a 20 52 46 43 20 37 38 33 0d 0a 0d 0a tes: RFC 783.... 0120 0d 0a 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 .. 0130 20 20 20 20 20 20 20 20 54 48 45 20 54 46 54 50 20 T HE TFTP 0140 50 52 4f 54 4f 43 4f 4c 20 28 52 45 56 49 53 49 PROTOCOL (REVISI 0150 4f 4e 20 32 29 0d 0a 0d 0a 53 74 61 74 75 73 20 ON 2)...Status 0160 6f 66 20 74 68 69 73 20 4d 65 6d 6f 0d 0a 0d 0a of this Memo.... 0170 20 20 20 54 68 69 73 20 52 46 43 20 73 70 65 63 This RFC spec 0180 69 66 69 65 73 20 61 6e 20 49 41 42 20 73 74 61 ifies an IAB sta 0190 6e 64 61 72 64 73 20 74 72 61 63 6b 20 70 72 6f ndards t rack pro 01a0 74 6f 63 6f 6c 20 66 6f 72 20 74 68 65 20 49 6e tocol fo r the In 01b0 74 65 72 6e 65 74 0d 0a 20 20 20 63 6f 6d 6d 75 ernet.. commu 01c0 6e 69 74 79 2c 20 61 6e 64 20 72 65 71 75 65 73 nity, an d reques 01d0 74 73 20 64 69 73 63 75 73 73 69 6f 6e 20 61 6e ts discu ssion an 01e0 64 20 73 75 67 67 65 73 74 69 6f 6e 73 20 66 6f d sugges tions fo 01f0 72 20 69 6d 70 72 6f 76 65 6d 65 6e 74 73 2e 0d r improv ements.. 0200 0a 20 20 20 50 6c 65 61 73 65 20 72 65 66 65 72 . Plea se refer 0210 20 74 6f 20 74 68 65 20 63 75 72 72 65 6e 74 20 to the current						

Παρατηρούμε ότι TFTP Header = 4 bytes.

Επομένως, TFTP Length = TFTP Header + Data = 4 + 512 = 516 bytes.

3.12) Το μέγεθος των δεδομένων είναι ίσο με 512 bytes.

No.	Time	Source	Destination	Protocol	Length	Info
63	13.171142328	147.102.131.21	147.102.40.15	TFTP	51	Read Request, File: rfc1350.txt, Transfer type: netascii
64	13.182833865	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 1
65	13.183029702	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 1
66	13.186745362	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 2
67	13.186925205	147.102.131.21	147.102.40.15	TFTP	32	Acknowledgement, Block: 2
68	13.194301001	147.102.40.15	147.102.131.21	TFTP	544	Data Packet, Block: 3
▶ Frame 64: 544 bytes on wire (4352 bits), 544 bytes captured (4352 bits) on interface tun0, id 0 Raw packet data ▶ Internet Protocol Version 4, Src: 147.102.40.15, Dst: 147.102.131.21 ▶ User Datagram Protocol, Src Port: 19674, Dst Port: 56659 ▶ Trivial File Transfer Protocol ▶ Data (512 bytes)						

3.13) Ο πελάτης το αντιλαμβάνεται την στιγμή όπου θα λάβει πακέτο, το οποίο έχει μέγεθος δεδομένων λιγότερο από 512 bytes.