

# 과제 07 수행보고서



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# 1. 과제 개요



- SimTL - ICMP 디코더 모듈 개발
  - ICMP 관련 RFC 문서를 이해한다.
    - RFC 777 - Internet Control Message Protocol
  - ICMP 디코더 모듈 추가
    - SimTL 에서 ICMP 프로토콜을 분석하는 모듈, 즉 ICMP 디코더 (Decoder) 를 개발하고, 분석 파일에 관련 부분을 추가한다.

## 2. 수행 과제 내용



- 요약파일에 프로토콜 유형 (ICMP) 와 간단한 설명을 기입한다.
- 감시한 프레임에 대해 ICMP 프로토콜을 분석 (디코딩) 하여 해당 파일에 기입한다.
- SimTL 의 수행결과를 Wireshark 의 결과와 비교하여 제대로 개발되었는지 확인한다.

# 3. 디코더 모듈 요구사항

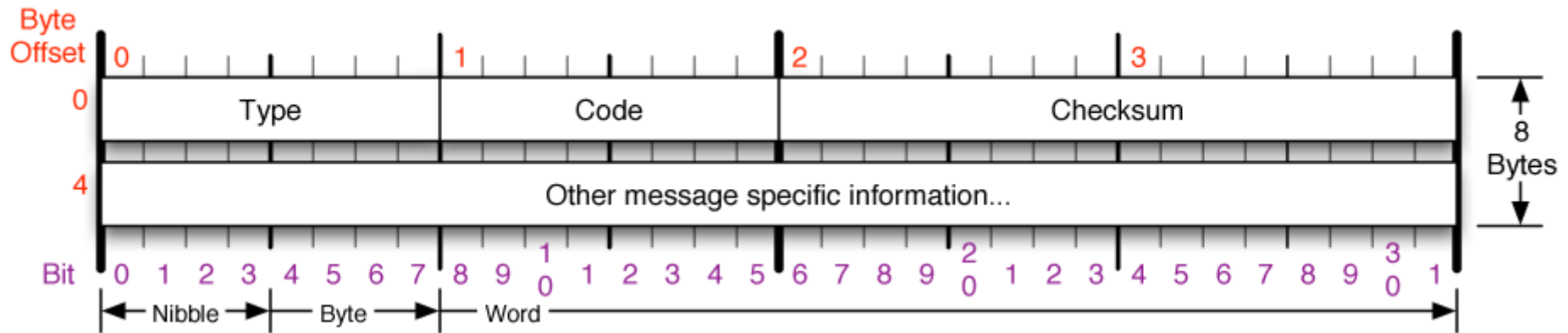


- SimTL - ICMP 디코더 모듈 개발 요구사항
  - 요약파일에 프로토콜 유형과 간단한 설명을 기입
  - 감시한 프레임해 대해 다음과 같이 ICMP 메시지를 분석.
    - Type0( 에코응답 ) 은 Type, Code, Checksum, Identifier, sequence 만 보여준다.
    - Type3( 목적지 도달불가 ) 은 Type, Code, Checksum 만 별도로 보여준다. 목적지 도달불가의 이유는 Code 를 해석하여 의미를 보여준다.
    - Type8( 에코요청 ) 은 Type0 과 마찬가지로 한다.
    - Type11( 시간초과 ) 는 Type3 과 마찬가지로 한다.
    - 나머지 Type 들은 Type 과 Code 만 별도로 보여준다.

# 4. ICMP 패킷 설명



## ICMP Header



Type, Code, Checksum : 고정된 크기  
나머지 부분들은 Type 과 Code 에 따라 각기 다른 형태를 지닌다.

# 5. RFC 777 문서 요약



요약파일보기

# 6. SimTL2 실행화면



The screenshot shows the SimTL2 application window. At the top, there is a 'Filter Rule' field containing 'host 192.168.10.145' and a 'Packet Number' field with a spinner set to '100'. To the right are 'Start' and 'Stop' buttons. Below this is a table header with columns: 'No', 'Time', 'Source', 'Destination', 'Protocol', and 'Info'. The main area is currently empty. At the bottom right, there are 'Save' and 'Cancel' buttons.

Annotations in Korean:

- 패킷 요약 정보 섹션 구분 (Packet summary information section separator)
- 패킷 요약 View (Packet summary View)
- Filter Rule 적는곳. (Filter Rule input location)
- 캡처할 패킷의 갯수 지정 (Specify the number of packets to capture)
- 캡처 시작과 정지 버튼. 정지버튼은 현재 미구현. (Capture start and stop buttons. Stop button is currently not implemented.)
- 패킷 상세 View (Packet details View)
- Save & Cancel 버튼 (Save & Cancel buttons)

# 7. SimTL 저장화면



```
pchero@MyNote: ~/Desktop/Study/Programming/KDEProject/simtl2/bin/test
파일(F) 편집(E) 보기(V) 터미널(T) 탭(B) 도움말(H)
pchero@MyNote: ~ X ip_icmp.h = (/usr/i... X pchero@MyNote: ~... X pchero@MyNote: ~... X pchero@MyNote: ~... X pchero@MyNote: /... X
pchero@MyNote: ~/Desktop/Study/Programming/KDEProject/simtl2/bin/test$ ls
pchero@MyNote: ~/Desktop/Study/Programming/KDEProject/simtl2/bin/test$
```

simtl2

..

:simtl:

- packet0
- packet1
- packet2
- simtl2
- test
- traceManager

확인

Make Directory

Remove Directory

Rename Directory

```
pchero@MyNote: ~/Desktop/Study/Programming/KDEProject/simtl2/bin/test
파일(F) 편집(E) 보기(V) 터미널(T) 탭(B) 도움말(H)
pchero@MyNote: ~ X ip_icmp.h = (/usr/i... X pchero@MyNote: ~... X pchero@MyNote: ~... X pchero@MyNote: ~... X pchero@MyNote: /... X
pchero@MyNote: ~/Desktop/Study/Programming/KDEProject/simtl2/bin/test$ ls
pchero@MyNote: ~/Desktop/Study/Programming/KDEProject/simtl2/bin/test$ ls
packet0 packet18 packet27 packet36 packet45 packet54 packet63 packet72 packet81 packet90 traceManager
packet1 packet19 packet28 packet37 packet46 packet55 packet64 packet73 packet82 packet91
packet10 packet2 packet29 packet38 packet47 packet56 packet65 packet74 packet83 packet92
packet11 packet20 packet3 packet39 packet48 packet57 packet66 packet75 packet84 packet93
packet12 packet21 packet30 packet4 packet49 packet58 packet67 packet76 packet85 packet94
packet13 packet22 packet31 packet40 packet5 packet59 packet68 packet77 packet86 packet95
packet14 packet23 packet32 packet41 packet50 packet6 packet69 packet78 packet87 packet96
packet15 packet24 packet33 packet42 packet51 packet60 packet7 packet79 packet88 packet97
packet16 packet25 packet34 packet43 packet52 packet61 packet70 packet8 packet89 packet98
packet17 packet26 packet35 packet44 packet53 packet62 packet71 packet80 packet9 packet99
pchero@MyNote: ~/Desktop/Study/Programming/KDEProject/simtl2/bin/test$
```



# 8. Echo Request - Wireshark



(Untitled) - Wireshark

File Edit View Go Capture Analyze Statistics Help

Filter:  + Expression... 비우기(C) 적용(A)

No.	Time	Source	Destination	Protocol	Info
68	21.032014	192.168.10.145	192.168.10.1	ICMP	Echo (ping) request
69	21.032925	192.168.10.1	192.168.10.145	ICMP	Echo (ping) reply
70	21.528201	192.168.10.145	203.212.171.217	UDP	Source port: 54168 Destination port: 44446
71	21.530467	192.168.10.1	192.168.10.145	ICMP	Destination unreachable (Fragmentation needed)

▶ Frame 68 (98 bytes on wire, 98 bytes captured)  
▶ Ethernet II, Src: Dell\_9a:53:74 (00:14:22:9a:53:74), Dst: Amit\_19:66:0c (00:50:18:19:66:0c)  
▶ Internet Protocol, Src: 192.168.10.145 (192.168.10.145), Dst: 192.168.10.1 (192.168.10.1)  
▼ Internet Control Message Protocol  
  Type: 8 (Echo (ping) request)  
  Code: 0 ()  
  Checksum: 0x54ba [correct]  
  Identifier: 0x990e  
  Sequence number: 974 (0x03ce)  
▼ Data (56 bytes)  
  Data: 03B33948D66A080008090A0B0C0D0E0F1011121314151617...

```
0020 0a 01 08 00 54 ba 99 0e 03 ce 03 b3 39 48 d6 6a  ....T...  ....9H.j
0030 08 00 08 09 0a 0b 0c 0d 0e 0f 10 11 12 13 14 15  ....
0040 16 17 18 19 1a 1b 1c 1d 1e 1f 20 21 22 23 24 25  .... .. !"#%
0050 26 27 28 29 2a 2b 2c 2d 2e 2f 30 31 32 33 34 35  &'()*+,- ./012345
0060 36 37                                     67
```

Identifier (icmp.ident), 2 bytes      Packets: 134 Displayed: 134 Marked: 0 Dropped: 0      Profile: Default

# 9. Echo Request - SimTL2



SimTL2

Filter Rule: host 192.168.10.145      Packet Number: 100      Start      Stop

	Time	Source	Destination	Protocol	Info
59	16.353316	192.168.10.1	192.168.10.145	ICMP	Echo Reply!
60	17.350716	192.168.10.145	192.168.10.1	ICMP	Echo Request!
61	17.354130	192.168.10.1	192.168.10.145	ICMP	Echo Reply!
62	18.350690	192.168.10.145	192.168.10.1	ICMP	Echo Request!
63	18.354094	192.168.10.1	192.168.10.145	ICMP	Echo Reply!
64	18.852610	192.168.10.145	203.212.171.217		
65	18.859276	192.168.10.1	192.168.10.145	ICMP	Destination Unreachable!
66	18.866767	192.168.10.145	203.253.33.6		

=====  
ICMP Packet  
ICMP Type : 8 (Echo Request!)  
ICMP Code : 0  
ICMP Checksum : 21690  
ICMP ID : 39182  
ICMP Sequence Number : 974  
=====

=====  
HEXA DATA  
=====  
00 50 18 19 66 0c 00 14 22 9a 53 74 08 00 45 00  
00 54 00 00 40 00 40 01 a4 c6 c0 a8 0a 91 c0 a8  
0a 01 08 00 54 ba 99 0e 03 ce 03 b3 39 48 d6 6a  
08 00 08 09 0a 0b 0c 0d 0e 0f 10 11 12 13 14 15  
16 17 18 19 1a 1b 1c 1d 1e 1f 20 21 22 23 24 25  
26 27 28 29 2a 2b 2c 2d 2e 2f 30 31 32 33 34 35  
36 37

Save      Cancel

# 10. Echo Reply - SimTL2



SimTL2

Filter Rule: host 192.168.10.145      Packet Number: 100      Start      Stop

	Time	Source	Destination	Protocol	Info
59	16.353316	192.168.10.1	192.168.10.145	ICMP	Echo Reply!
60	17.350716	192.168.10.145	192.168.10.1	ICMP	Echo Request!
61	17.354130	192.168.10.1	192.168.10.145	ICMP	Echo Reply!
62	18.350690	192.168.10.145	192.168.10.1	ICMP	Echo Request!
63	18.354094	192.168.10.1	192.168.10.145	ICMP	Echo Reply!
64	18.852610	192.168.10.145	203.212.171.217		
65	18.859276	192.168.10.1	192.168.10.145	ICMP	Destination Unreachable!
66	18.866767	192.168.10.145	203.253.33.6		

----- ICMP Packet -----

ICMP Type : 0 (Echo Reply!)  
ICMP Code : 0  
ICMP Checksum : 23738  
ICMP ID : 39182  
ICMP Sequence Number : 974

----- HEXA DATA -----

```
00 14 22 9a 53 74 00 50 18 19 66 0c 08 00 45 00
00 54 a3 00 00 00 40 01 41 c6 c0 a8 0a 01 c0 a8
0a 91 00 00 5c ba 99 0e 03 ce 03 b3 39 48 d6 6a
08 00 08 09 0a 0b 0c 0d 0e 0f 10 11 12 13 14 15
16 17 18 19 1a 1b 1c 1d 1e 1f 20 21 22 23 24 25
26 27 28 29 2a 2b 2c 2d 2e 2f 30 31 32 33 34 35
36 37
```

Save      Cancel

# 11. Destination - Wireshark



(Untitled) - Wireshark

File Edit View Go Capture Analyze Statistics Help

Filter:  + Expression... 비우기(C) 적용(A)

No.	Time	Source	Destination	Protocol	Info
69	21.032925	192.168.10.1	192.168.10.145	ICMP	Echo (ping) reply
70	21.528201	192.168.10.145	203.212.171.217	UDP	Source port: 54168 Destination port: 44446
71	21.530467	192.168.10.1	192.168.10.145	ICMP	Destination unreachable (Fragmentation needed)
72	21.530670	192.168.10.145	203.212.171.217	DNS	Standard query PTR 1 10 168 192 in-addr arpa

Internet Protocol, Src: 192.168.10.1 (192.168.10.1), Dst: 192.168.10.145 (192.168.10.145)

Internet Control Message Protocol

- Type: 3 (Destination unreachable)
- Code: 4 (Fragmentation needed)
- Checksum: 0x55fb [correct]
- MTU of next hop: 1400

Internet Protocol, Src: 192.168.10.145 (192.168.10.145), Dst: 203.212.171.217 (203.212.171.217)

- Version: 4
- Header length: 20 bytes
- Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)
- Total Length: 1500
- Identification: 0x0000 (0)
- Flags: 0x04 (Don't Fragment)
- Fragment offset: 0
- Time to live: 2
- Protocol: UDP (0x11)
- Header checksum: 0x302a [correct]
- Source: 192.168.10.145 (192.168.10.145)
- Destination: 203.212.171.217 (203.212.171.217)

User Datagram Protocol, Src Port: 54168 (54168), Dst Port: 44446 (44446)

```
0000  00 14 22 9a 53 74 00 50 18 19 66 0c 08 00 45 00  ..".St.P ..T...E.
0010  00 38 a4 00 00 00 40 01 40 e2 c0 a8 0a 01 c0 a8  .8...@. @.....
0020  0a 91 03 04 55 fb 00 00 05 78 45 00 05 dc 00 00  ....U...xE.....
0030  40 00 02 11 30 2a c0 a8 0a 91 cb d4 ab d9 d3 98  @...0*.....
0040  ad 9e 05 c8 1a 89  .....
```

Source (ip.src), 4 bytes      Packets: 134 Displayed: 134 Marked: 0 Dropped: 0      Profile: Default

# 12. Destination - SimTL2



SimTL2

Filter Rule: host 192.168.10.145      Packet Number: 100      Start      Stop

	Time	Source	Destination	Protocol	Info
62	18.350690	192.168.10.145	192.168.10.1	ICMP	Echo Request!
63	18.354094	192.168.10.1	192.168.10.145	ICMP	Echo Reply!
64	18.852610	192.168.10.145	203.212.171.217		
<b>65</b>	<b>18.859276</b>	<b>192.168.10.1</b>	<b>192.168.10.145</b>	<b>ICMP</b>	<b>Destination Unreachable!</b>
66	18.866767	192.168.10.145	203.253.33.6		
67	18.877477	203.253.33.6	192.168.10.145		
68	19.191110	192.168.10.145	211.234.240.171	TCP	
69	19.198917	211.234.240.171	192.168.10.145	TCP	

----- ICMP Packet -----  
ICMP Type : 3 (Destination Unreachable!)  
ICMP Code : 4 -> FRAG NEEDED  
ICMP Checksum : 22011

----- IP Datagram -----  
192.168.10.145 ---> 203.212.171.217  
Version : 4  
Header Length : 5  
Service : 0  
Total Length : 1500  
Identification : 0  
Fragment Offset : 16384  
Time To Live : 2  
Protocol : 17  
Checksum : 12330

Save      Cancel

# 13. Time Exceed - Wireshark



(Untitled) - Wireshark

File Edit View Go Capture Analyze Statistics Help

Filter:  + Expression... 비우기(C) 적용(A)

No.	Time	Source	Destination	Protocol	Info
56	16.510370	192.168.10.1	192.168.10.145	ICMP	Time-to-live exceeded (Time to live exceeded in transit)
57	16.516245	192.168.10.145	203.253.33.6	DNS	Standard query PTR 1.10.168.192.in-addr.arpa
58	16.520691	203.253.33.6	192.168.10.145	DNS	Standard query response, No such name
59	17.024014	192.168.10.145	192.168.10.1	ICMP	Echo (ping) request

▶ Frame 56 (70 bytes on wire, 70 bytes captured)

- ▶ Ethernet II, Src: Amit\_19:66:0c (00:50:18:19:66:0c), Dst: Dell\_9a:53:74 (00:14:22:9a:53:74)
- ▶ Internet Protocol, Src: 192.168.10.1 (192.168.10.1), Dst: 192.168.10.145 (192.168.10.145)
- ▼ Internet Control Message Protocol
  - Type: 11 (Time-to-live exceeded)
  - Code: 0 (Time to live exceeded in transit)
  - Checksum: 0xf728 [correct]
- ▼ Internet Protocol, Src: 192.168.10.145 (192.168.10.145), Dst: 203.212.171.217 (203.212.171.217)
  - Version: 4
  - Header length: 20 bytes
  - ▶ Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)
  - Total Length: 1500
  - Identification: 0x0000 (0)
  - ▶ Flags: 0x04 (Don't Fragment)
  - Fragment offset: 0
  - Time to live: 1
  - Protocol: UDP (0x11)
  - ▶ Header checksum: 0x312a [correct]
  - Source: 192.168.10.145 (192.168.10.145)
  - Destination: 203.212.171.217 (203.212.171.217)

```
0000 00 14 22 9a 53 74 00 50 18 19 66 0c 08 00 45 00  ..".St.P ..f...E.
0010 00 38 9e 00 00 00 40 01 46 e2 c0 a8 0a 01 c0 a8  .8...@. F.....
0020 0a 91 0b 00 f7 28 00 00 00 00 45 00 05 dc 00 00  .....(.. ..E.....
0030 40 00 01 11 31 2a c0 a8 0a 91 cb d4 ab d9 d3 98  @...1*.. ....
0040 ad 9d 05 c8 76 d8  ....v.
```

Frame (frame), 70 bytes      Packets: 134 Displayed: 134 Marked: 0 Dropped: 0      Profile: Default

# 14. Time Exceed - SimTL2



SimTL2

Filter Rule: host 192.168.10.145      Packet Number: 100      Start      Stop

	Time	Source	Destination	Protocol	Info
47	13.341948	192.168.10.145	192.168.10.1	ICMP	Echo Request!
48	13.344675	192.168.10.1	192.168.10.145	ICMP	Echo Reply!
49	13.824847	192.168.10.145	203.212.171.217		
50	13.832757	192.168.10.1	192.168.10.145	ICMP	Time Exceeded!
51	13.834050	192.168.10.145	203.253.33.6		
52	13.844471	203.253.33.6	192.168.10.145		
53	14.341998	192.168.10.145	192.168.10.1	ICMP	Echo Request!
54	14.344976	192.168.10.1	192.168.10.145	ICMP	Echo Reply!

----- ICMP Packet -----  
ICMP Type : 11 (Time Exceeded!)  
ICMP Code : 0 -> Time-to-live value is zero  
ICMP Checksum : 63272

----- IP Datagram -----  
192.168.10.145 ---> 203.212.171.217  
Version : 4  
Header Length : 5  
Service : 0  
Total Length : 1500  
Identification : 0  
Fragment Offset : 16384  
Time To Live : 1  
Protocol : 17  
Checksum : 12586

Save      Cancel

# 15. Reference



- <http://www.kldp.org>
  - 한글 리눅스 문서 프로젝트 ( 리눅스 관련 자료들이 풍부함 .)
- <http://www.joinc.co.kr>
  - 조인시 위키 (C 언어 함수 레퍼런스가 풍부함 .)
- <http://trolltech.com>
  - Qt 를 개발한 트롤테크 홈페이지
- <http://korone.net>
  - QT 관련 자료가 풍부한 곳 .
- TCP/IP Protocol Suite - Behrouz A. Forousan
- 유닉스 시스템 & 네트워크 프로그래밍 - 신재호
- 열혈강의 QT Programming - 서영진



끝



감사합니다 .