Packet Generator User Guide V0.3

Based on DeanSys Pktgen-0.0.7

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Contents

Chapter 1. Abstract

DeanSys Pktgen is designed by www.deansys.com. This site is Dean's personal site to design different system solutions for the different requirement. We are looking for guys who are interested in Linux/UNIX system design. Please send us email if you want to share your good ideas with us!

User Interface (UI) of this packet generator is designed following the format of switch. User can type in commands in the same way what they are doing on the switch. They can type '?' anywhere to get help about the commands, can type 'tab' to complete the command automatically. And it offers auto-building functions that they can build well known protocol packets with some parameters automatically. User also can set the raw packets with different configuration file with a simple command.

It can only work under UNIX/Linux system. Red Hat Linux 9.0 is the best choice. And Red Hat Linux ES/AS version is also acceptable. Make sure that you have got one Ethernet interface card at least.

V0.0.4 is the first shared version. It support Command Line Interface (CLI) for the user. User can build a packet from raw text file or with the help from Protocol Builder function.

Multi users can use this packets generator at the same time. And the multi-stream and multi-task function has been supported since version 0.0.5. You can create more streams and control them at the same time. It is available to send different streams through different net interface cards at the same time. It depends on you!

Version0.0.6 has offered user an easy way to load packets from Libpcap data file. What you need is just to capture packets into Libpcap file. More function will be available in the next version.

Increased stream/packet is supported since V0.0.7. User can set some byte to be increased with the step value. When the step value is less than zero, it means decreased.

The current version is v0.0.7.

This is the final version of CLI Specification when I was in Accton. More details will be available in the next version. Please send mail to me if you have found any bug or have got any suggestion to me. Thank you!

Following are some symbol logo for the reader.

	This is a tip. Maybe is it useless for you.
	This is a warning.

1.1 Scope

This document is designed for the user of packet generator or anyone who is interested with the packet generator. I am sorry that I did not spend enough time finding the mistakes in this document. Then please send me mail if you have found any mistakes in this document. Thank you!

The reader must have some basic knowledge of Ethernet packets and network.

1.2 Feature List

The packet generator is designed to support:

A. A command line interface to type in commands
B. A command generator to make commands easy to type
C. Command history to record your commands
D. Build well-known protocol packets with the building command.
E. Read raw text file to build any packet.
F. Load packet data from Libpcap data file.
G. Multi-task and multi-stream to send packets at the same time.
H. System logging.
I. Increased/Decreased streams.
J. Others.

New feature will be added in the coming versions.

Chapter 2. How to install it?

Get the tar ball and use the following command to install it:

```
[root@DeanOS small_pktgen]#
[root@DeanOS small_pktgen]# tar -xzvf pktgen.0.0.6.tar.gz
pktgen.0.0.6/
pktgen.0.0.6/pktgen
pktgen.0.0.6/packet.conf
pktgen.0.0.6/arp.cap
[root@DeanOS small_pktgen]#
```

Then it is available for you.

Make sure that the tar ball contains two files at least:

pktgen -- the main binary file

packet.conf -- the default text data file

The way to build a packet looks like below:

(1). Make sure what you want, and then start the program.

(2). Create stream you want. You can create them with:

A. Read raw packet from named text file.

B. Load packets from libpcap data file.

B. Well-known protocols with the packet building function.

(3). Set the interface name, number of packet, pause time between packets and increased mode. Or just skip them to keep the default.

(4). Check the settings of streams. Modify the setting and values if necessary. Make sure they are what you want.

(5). Send the stream you want to send.

(6). Check the result.

The first and second steps can be exchanged with each other. You decide the order.

Note: You must be able to access the interface! 'root' is the suggested user group.

How to change the binary's user mode and privilege?

Just type following commands:

```
[root@DeanOS pktgen.0.0.7]# chown root.root pktgen
[root@DeanOS pktgen.0.0.7]# chmod a+s pktgen
[root@DeanOS pktgen.0.0.7]# ls -l
总用量 828
-rw-r--r--    1 root     root          176  4月   6 03:00 arp.cap
-rw-r--r--    1 root     root          161  4月   6 03:00 packet.conf
-rwsr-sr-x    1 root     root       835253  4月   6 03:00 pktgen
[root@DeanOS pktgen.0.0.7]#
```

Chapter 3. Command description

There are three command modes in the packet generator. They are global mode, configuration mode and build mode.

Global mode contains the basic commands of this packet generator. You can check the stream, edit the packet buffer or stream, and send packets. They are the basic level commands.

Build mode is used to build packets. You can build it with protocol building function, reading raw text and loading libpcap data file.

Configuration mode is used to modify different settings with a specified stream.

All the commands can be listed by typing '?' or help. And all the commands can be completed automatically by type 'tab'. Short and uncompleted commands are also available.

Colors will be used to make the messages more easy-reading.
Error and warning messages will be printed with **red color**.
Status and help messages will use **green** **or** **yellow**.

Chapter 4. Global Mode Commands

Run the program and you will be into the global mode:

Type '?' to get the command list as :

```
[root@DeanOS pktgen.0.0.7]# ./pktgen
-----------------------------------------------
 Welcome to use This packet generator!
-----------------------------------------------
 Type 'exit' or Ctrl+C to logout.
pktgen#
  build      Change to build mode to build packet automatically.
  clear      Clear the data value in buffer.
  configure  Change to configure mode to modify the settings.
  debug      Enable debug message in system
  edit       Edit the data value in buffer.
  end        Back to global mode automatically.
  exit       Exit current mode and down to previous mode
  help       Print command help messages.
  list       Print command list
  no         Disable the function
  send       Send the packet in buffer.
  set        Set stream configuration.
  show       Show information.
pktgen#
```

Type ‘list’ to get command list:

```
pktgen#list
  build [StreamID]
  clear [StreamID]
  configure [StreamID]
  debug
  edit <1-1518> VALUE
  edit <1-1518> VALUE <1-16>
  end
  exit
  help
  list
  no debug
  send
  send <1-16>
  send all
  set stream <1-16> postion <1-1514> step VALUE
  show buffer
  show buffer <1-16>
  show interface [WORD]
  show memory
  show netstat
  show packet counter [WORD]
  show router
  show stream
  show stream <1-16>
  show system
  show version
pktgen#
```

4.1 Build Command:

Type ‘build’ to enable build mode. Then packet builder function is available for you. This command has an optional parameter: [Stream ID]. You can specify the stream ID number which you want to build or just keep it empty to use the default stream ID 1 with the default packet configuration file.

If the stream you specify is not existed, system will help you to create a default stream name stream 1 with default setting and values.

pktgen#build
Select packet.conf as the default config file.
Create new stream :1 with default configuration.
Change to build mode!
pktgen(build)#

pktgen#build 2
Select packet.conf as the default config file.
Create new stream :2 with default configuration.
Change to build mode!
pktgen(build)#

4.2 Clear Command:

This command is used to reset the value in buffer to zero. You can specify the stream ID number which to be cleared. Stream ID is an optional parameter

pktgen#clear
Debug : Clear the buffer of stream 1.
pktgen#

pktgen#clear 2
Debug : Clear the buffer of stream 2.
pktgen#

4.3 Configure Command:

Type in ‘configure’ to enable configuration mode. Then you can modify the stream setting such as: interface, number, length and pause time. You can specify the stream ID number which to be configured. Stream ID is an optional parameter.

If the stream you specify is not existed, system will help you to create a default stream name stream 1 with default setting and values.

pktgen#configure
Change to Stream :1
Change to configure mode!
pktgen(config)#

pktgen#configure 2
Select packet.conf as the default config file.
Create new stream :2 with default configuration.
Change to configure mode!
pktgen(config)#

4.4 Debug Command:

Command of ‘debug’ is used to enable the system logging function. After you have enabled this function, system will print much more logging messages. You can use ‘no debug’ to disable it.

4.5 Edit Command:

Type ‘edit <1-1518> VALUE [StreamID]’ to modify the value in stream buffer. You can use ‘show’ first to verify the value in buffer. The packet units is from 1 to 1518.

You can specify the stream ID number which to be configured. Stream ID is an optional parameter

pktgen#show buffer

Packet Generator Status:

Device: eth0, Length: 64 byte, Number: 1, Pause: 0 s

Data from Configuration file.

```
      01 02 03 04 05 06 07 08  09 10 11 12 13 14 15 16
----+-----------------------  -----------------------
0001|ff ff ff ff ff ff 01 02  03 04 05 06 88 8e 01 01
0002|00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
0003|00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
0004|00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
0005|
----+-----------------------  -----------------------
```

pktgen#edit

<1-1518> Position in buffer.

pktgen#edit 1

VALUE The value you want to set.(0x0-0xFF)

pktgen#edit 1 0

<cr>

<1-16> Stream ID number.Default is the last stream.

pktgen#edit 1 0 1

<cr>

pktgen#edit 1 0 1

pktgen#

The first byte in buffer here is 1, not 0. It is just to be easy to read. Both of decimal and hex value is acceptable. (Hex value is beginning with 0x)

4.6 End Command:

Command of ‘end’ is used to go back to global mode from anywhere.

4.7 Exit Command:

Command of ‘exit’ is used to end the execution and exit the system.

4.8 Help Command:

Command of ‘help’ is used to show the help message about the system and commands.

4.9 List Command:

Command of ‘list’ is used to list all the command in current mode.

4.10 No Command:

Command of ‘no’ is used to disable some function or delete some settings.

At now, only ‘no debug’ is supported to disable system debug function.

4.11 Set Command:

Command of ‘set’ is used to enable the increased mode on a stream. You need to specify the stream ID, position of buffer and the step value. The max step value is 65535 and max increased buffer is 2 bytes (16bits, 65536).

4.12 Send Command:

Type in ‘send’ command to send the packet in buffer with the configuration value. You can select to send a specify stream or all of them. If you just type in ‘send’, system will send the last stream you configure/build only.

System is able to send all the streams at the same time. If there are more than one stream on the same interface, system will send them at the same time with mixing them together. Stream schedule will be available in the next version. Then you can specify the transmit mode with multi-stream (one by one, or mixed together).

pktgen#send ?

<cr>

<1-16> Stream ID number.(1-16)

all All the stream.

pktgen#send

pktgen#send

Packet Number :1 Length :64 Device :eth0

Wrote 64 bytes packet; check the wire.

pktgen#

4.13 Show Command:

'show ' command is used to show the packet generator status. It contains streams status and system status.

```
pktgen#show ?
  buffer     Show buffer information.
  interface  Interface status and configuration
  memory     Memory allocate/free status
  netstat    Network status and configuration
  packet     Packet status and configuration
  router     Local router status and configuration
  stream     Displays the last stream status.
  system     Displays system status
  version    Displays pktgen version
pktgen#show
```

4.13.1 Show Buffer Command:

This command is used to check the data in buffer. The size of content depends on the length of packet.

You can specify the stream with the stream ID number. It is an optional parameter. System will print the last buffer you configure/build if there is no stream ID given.

pktgen#show buffer

Packet Generator Status:

Device: eth0, Length: 64 byte, Number: 1, Pause: 0 s

Data from Configuration file.

```
     01 02 03 04 05 06 07 08  09 10 11 12 13 14 15 16
----+-----------------------  -----------------------
```

```
0001|ff ff ff ff ff ff 01 02  03 04 05 06 88 8e 01 01
0002|00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
0003|00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
0004|00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
0005|
----+-----------------------  -----------------------

pktgen#
```

4.13.2 Show Interface Command:

This command is used to show the interface status and setting. Interface name is optional.

```
pktgen#show interface
  [WORD]  Inteface name
pktgen#show interface
eth0        Link encap:Ethernet  HWaddr 00:0C:29:43:5F:A0
            inet addr:192.168.110.98  Bcast:192.168.110.255
Mask:255.255.255.0
            UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
            RX packets:715985 errors:10 dropped:41 overruns:0 frame:0
            TX packets:110995 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:100
            RX bytes:69181980 (65.9 Mb)  TX bytes:22037593 (21.0 Mb)
            Interrupt:10 Base address:0x1080

eth1        Link encap:Ethernet  HWaddr 00:0C:29:43:5F:AA
            BROADCAST MULTICAST  MTU:1500  Metric:1
            RX packets:6 errors:0 dropped:0 overruns:0 frame:0
            TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:100
            RX bytes:1671 (1.6 Kb)  TX bytes:0 (0.0 b)
            Interrupt:9 Base address:0x1400

lo          Link encap:Local Loopback
            inet addr:127.0.0.1  Mask:255.0.0.0
            UP LOOPBACK RUNNING  MTU:16436  Metric:1
            RX packets:179 errors:0 dropped:0 overruns:0 frame:0
```

```
        TX packets:179 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:21853 (21.3 Kb)    TX bytes:21853 (21.3 Kb)

pktgen#
```

4.13.3 Show Memory Command:

This command is used to show the system memory status. The information contains physical memory, virtual memory and swap partition.

```
pktgen#show memory
                total        used        free      shared     buffers      cached
Mem:        194668      185056        9612           0       85460       63528
-/+ buffers/cache:       36068      158600
Swap:       425712        5096      420616
pktgen#
```

4.13.4 Show Netstat Command:

This command is used to show the system network session status.

```
pktgen#show netstat
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 *:32768                 *:*                     LISTEN
tcp        0      0 DeanOS:32769            *:*                     LISTEN
tcp        0      0 *:cvspserver            *:*                     LISTEN
tcp        0      0 *:sunrpc                *:*                     LISTEN
tcp        0      0 *:ssh                   *:*                     LISTEN
tcp        0      0 DeanOS:ipp              *:*                     LISTEN
tcp        0      0 DeanOS:smtp             *:*                     LISTEN
tcp        0     20 192.168.110.98:ssh      dean:1312               ESTABLISHED
tcp        0      0 192.168.110.98:ssh      dean:1305               ESTABLISHED
```

```
udp   0      0 *:32768                 *:*
udp   0      0 *:906                   *:*
udp   0      0 *:sunrpc                *:*
udp   0      0 *:631                   *:*
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags       Type       State         I-Node Path
unix  3      [ ]         STREAM     CONNECTED     78166
unix  3      [ ]         STREAM     CONNECTED     78165
unix  3      [ ]         STREAM     CONNECTED     78009
unix  3      [ ]         STREAM     CONNECTED     78008
unix  2      [ ]         DGRAM                    2023
unix  2      [ ]         DGRAM                    1854
unix  2      [ ]         DGRAM                    1819
unix  2      [ ]         DGRAM                    1805
unix  2      [ ]         DGRAM                    1747
unix  2      [ ]         DGRAM                    1502
unix  2      [ ]         DGRAM                    1359
unix  2      [ ]         DGRAM                    1324
pktgen#
```

4.13.5 Show Packet Counter Command:

This command is used to show the system packet counters. Interface name is optional. Default value is to show all of them.

```
pktgen#show packet counter
Iface MTU    RX-OK RX-ERR RX-DRP TX-OK  TX-ERR TX-DRP
eth0  1500 720885     10     41 111077      0      0
eth1  1500      6      0      0      0      0      0
lo   16436    179      0      0    179      0      0
pktgen#
```

4.13.6 Show Router Command:

This command is used to check the system router status.

```
pktgen#show router
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
192.168.110.0   *               255.255.255.0   U     0      0        0 eth0
169.254.0.0     *               255.255.0.0     U     0      0        0 eth0
127.0.0.0       *               255.0.0.0       U     0      0        0 lo
default         gateway         0.0.0.0         UG    0      0        0 eth0
pktgen#
```

4.13.7 Show Stream Command:

This command is used to check the stream status. You can specify the stream ID which you want. It is an optional value. Default value is to show all of the streams.

```
pktgen#show stream ?
  <cr>
  <1-16>  Stream ID numebr.
pktgen#show stream
Current Stream status:
ID     Length   Interface    Number   Pause    From
------ -------- ------------ -------- -------- ----------
     1       64         eth0        1        0 File
------ -------- ------------ -------- -------- ----------
Total Stream :1
pktgen#
```

4.13.8 Show System Command:

This command is used to check the system status.

```
pktgen#show system
DeanSys Packet Generator System status:
Linux DeanOS 2.4.20-8 #1 Thu Mar 13 17:54:28 EST 2003 i686 i386 GNU/Linux
pktgen#
```

4.13.9 Show Version Command:

This command is used to get version information.

```
pktgen#show version
-----------------------------------------------
Packet Generator Version Information
   Name    : Packet Generator 0.0.6
   Author: Dean Ding
   Date    : Mar.26,2007
   Note    : Based on GNU Linux System
           : www.deansys.com
-----------------------------------------------
pktgen#
```

Chapter 5. Build Mode Commands

Type ‘build’ to change to build mode. Then you will get the commands to build well-known protocol packets.

pktgen#build

pktgen(build)#

Type ‘?’ to get commands help message:

```
pktgen(build)#
  arp     Build ARP packet automatically.
  bgp     Build BGP4 packet automatically.
  cdp     Build CDP packet automatically.
  dhcp    Build DHCP packet automatically.
  dns     Build DNS packet automatically.
  dot1x   Build Dot1x packet automatically.
  end     Back to global mode automatically.
  exit    Exit current mode and down to previous mode
  gre     Build GRE packet automatically.
  help    Print command help messages.
  icmp    Build ICMP PING OF DEATH packet automatically.
  ieee    Build IEEE802.2 packet automatically.
  igmp    Build IGMP_MEMBERSHIP_QUERY packet automatically.
  isl     Build ISL packet automatically.
  list    Print command list
  load    Load packet from file automatically.
  mpls    Build MPLS packet automatically.
  ospf    Build OSPF packet automatically.Type: IBI/MBIT/MSBIT.
  pim     Build PIM packet automatically.
  raw     Build packet from configuration file automatically.
  rip     Build RIP packet automatically.
  stp     Build STP packet automatically.
  tcp     Build TCP packet automatically.
  udp     Build UDP packet automatically.
pktgen(build)#
pktgen(build)#
```

Table 2 Build mode command

Command	Description
arp	Build ARP packet.
bgp	Build BGPv4 packet. (**OPEN, UPDATE, NOTIFICATION, KEEPALIVE**)
cdp	Build CDP packet.
dhcp	Build DHCP packet.

	(**REQUEST, REPLY**)
dns	Build DNS packet.
dot1x	Build 802.1x EAP packet. (**START, LOGOFF, EAP PACKET**)
end	Back to global mode.
exit	Exit to global mode.
gre	Build GRE packet.
help	Print command help message.
icmp	Build ICMP packet.
ieee	Build IEEE 802.2/802.3 packet
isl	Build ISL packet.
igmp	Build IGMP packet. (**MEMBERSHIP_QUERY**, **MEMBERSHIP_REPORT**, **LEAVE_GROUP**)
load	Load packets from libpcap data file
list	Print commands list.
mpls	Build MPLS packet.
ospf	Build OSPF packet. (**HELLO, UMD, LSA, DBD, LSR, LSU**)
pim	Build PIM packet
raw	Build raw packets with configuration file.
rip	Build RIP packet. (**REQUEST, RESPONSE, TRACEON,** **TRACEOFF, POLL, POLLENTRY, MAX**)
stp	Build STP packet.
tcp	Build TCP packet.
udp	Build UDP packet.
?	Get help message

5.1 OSPF Commands:

Type in ‘ospf ?‘ in build mode, then you will find the types of OSPF.

```
pktgen(build)#ospf ?
  dbd       OSPF DBD packet.
  hello     OSPF Hello packet.
  lsa       OSPF LSA packet.
pktgen(build)#
```

The OSPF command list is :

ospf dbd [dest_ip] [src_ip] [type]
ospf hello [dest_ip] [src_ip] [neighbor_ip]
ospf lsa [dest_ip] [src_ip]

5.1.1 OSPF DBD command:

The DBD type is : IBI/MBIT/MSBIT

pktgen(build)# ospf dbd 192.168.110.1 192.168.110.254 ibi

5.1.2 OSPF HELLO command:

An expmale is:

pktgen(build)#ospf hello 192.168.110.254 192.168.110.2 192.168.110.23

5.2 RIP Commands:

RIP command format is :

rip [rip_add] [rip_netmask] [next_hop] [dest_ip]

pktgen(build)#rip 192.168.110.98 255.255.255.0 192.168.110.9 192.168.110.254

5.3 PIM Commands:

Type pim in build mode, then you will be asked for source and destination IP address. It just support PIMv2 HELLO packet right now.

pktgen(build)# pim hello 192.167.110.1 19.168.11.1

5.4 RAW Commands:

Type in raw command in build mode to select an existed configuration file to load the packet data from. The default configuration file is ‘packet.conf’. Default will be selected if you just type raw without any parameter.

For example, if you want to use the default configuration file, then just type ‘raw’:

pktgen(build)#raw

Select packet.conf as the default config file.

If you want to use another file, just type ‘raw filename’

pktgen(build)#raw test.conf

Select test.conf as the default config file.

Make sure the file you have selected is in the same fold and it should be filled with correct format. An example file will look like:

```
loada:ffffffffffff0001 02030405888e0101
loadb:0000000000000000 0000000000000000
loadc:0000000000000000 0000000000000000
loadd:0000000000000000 0000000000000000
loade:0000000000000000 0000000000000000
loadf:0000000000000000 0000000000000000
loadg:0000000000000000 0000000000000000
```

At present, the max length is 112 bytes. You can use ‘length’ command in configuration mode to modify the length. The default length is 60 bytes. If you want

to use lager packet, please tell me that. And I will modify it later.

5.5 IGMP Command:

An example is:

pktgen(build)#igmp 224.0.0.1 192.168.110.1

5.6 Load Command:

At right now, loading function only supports libpcap format data file. You can use following command to load packets from named libpcap data file:

pktgen(build)#load
cap Select libpcap file to load.
pktgen(build)#load cap
WORD File name you want to load.
pktgen(build)#load cap arp.cap
Success to load 2 packets from arp.cap.
Packet number is [2].
pktgen(build)#

5.7 Other Commands:

The development for other protocols has not been finished yet and will be available in the next version. Please send me mail if you have found any bugs. Thanks a lot!

Chapter 6. Configuration Mode Commands

Type the command of ‘configure’ to change to configuration mode to modify the configuration setting and values. The configuration options will be: number, length, interface and pause time. You can just skip this step to keep the default value. The default value will be:

Interface	eth0
Length	60bytes
Number	1
Pause time	0 second

Commands look like:

```
pktgen#configure
  Create new stream :1 with default configuration.
  Change to configure mode!
pktgen(config)#
  end         Back to global mode automatically.
  exit        Exit current mode and down to previous mode
  help        Print command help messages.
  interface   Select interface to send packets.
  length      Set packet length.
  list        Print command list
  number      Set packets number.
  pause       Set pause time between packets.
  time        Set pause time between packets.
pktgen(config)#list
  end
  exit
  help
  interface WORD
  length <16-1518>
  list
  number <1-1000000000>
  pause microsecond <100-999999>
  pause second <0-3600>
  time <0-3600>
pktgen(config)#
```

6.1 Interface Command:

Type the command of ‘interface’ to select a Network Interface Card (NIC) to send your packet. Interface name is an optional value. Default card is ‘eth0’.

```
pktgen(config)#interface eth0
      Device is eth0
pktgen(config)#
```

Make sure that the name of the card is correct. Otherwise you will get error messages. Or you can query the list of the available interface first. Just type in ‘show interface’ in global mode.

6.2 Number Command:

Type number command to set the number of packets you want to build and send out. The range is 1 - 65535. Default value is 1.

```
pktgen(config)#number 10
   Packet number is 10
pktgen(config)#
```

6.3 Length Command:

Type the command of ‘length’ to set the value of packet length. The range is 16-1518. Default value is 60.

```
pktgen(config)#length 64
   Length is 64bytes
pktgen(config)#
```

6.4 Pause Command:

The ‘pause’ command is to set the pause seconds and microseconds between every

two packets. Second value is from 0 to 3600. Microsecond value is from 0 to 999999. Default value is 0 (no pause).

```
pktgen(config)#pause ?
   microsecond    Microsecond based time value. Pause time value.
   second         Second based time value. Pause time value.
pktgen(config)#pause microsecond ?
   <0-999999>
pktgen(config)#pause microsecond 100 ?
   <cr>
pktgen(config)#pause microsecond 100
pktgen(config)#pause ?
   microsecond    Microsecond based time value. Pause time value.
   second         Second based time value. Pause time value.
pktgen(config)#pause second ?
   <0-3600>
pktgen(config)#pause second 1
pktgen(config)#
```

As the reason of Linux kernel, the microsecond time value is not as exactly as we expected. Then it is recommended not to set the microsecond value less then 100.

6.5 Time Command:

Type time command to set the pause seconds between every two packets. The range is 0-3600. Default value is 0 (no pause).

```
pktgen(config)#time 1
   Pause time is 1 second.
pktgen(config)#
```

6.6 Other Commands:

Other commands such as ‘list’ and ‘help’ are the same will the command in global mode. More configure commands will be available in the future.

Chapter 7. Advanced Usage

It is recommended to be familiar with the commands. Most of the complex simulation will be available after you have combined some necessary simple commands. Here is a simple examples.

Example One: If we want to send 65535 different source mac addresses packets through interface eth0 and eth1 at the same time, we can type following commands:

```
[root@localhost tool]# ./pktgen
-------------------------------------------
 Welcome to use This packet generator!
-------------------------------------------
 Type 'exit' or Ctrl+C to logout.
pktgen#configure 1                              <-------Create Stream 1
  Create new stream :1 with default configuration.
  Change to configure mode!
pktgen(config)#interface eth0                   <-------Select interface eth0
pktgen(config)#number 65535                     <-------Set repeat number to 65535
pktgen(config)#exit
pktgen#set stream 1 postion 12 step 1           <-------Set increased byte in buffer
  Set stream 1 buffer to increse 1 at the 12 byte.
pktgen#configure 2                              <-------Create Stream 2
  Create new stream :2 with default configuration.
  Change to configure mode!
pktgen(config)#interface eth1                   <-------Select interface eth1
pktgen(config)#number 65535                     <-------Set repeat number to 65535
pktgen(config)#exit
pktgen#set stream 2 postion 12 step 1           <-------Set increased byte in buffer
  Set stream 2 buffer to increse 1 at the 12 byte.
pktgen#send all                                 <--------Send all the streams
```

It is important to design the details first.

It is a good idea to run this binary with some scripts (such as Shell, TCL/Expect). It will help you to create much more complex simulation!

Chapter 8. Notes

This is an unfinished version. Extra details will be added. And if you have any suggestions or ideas, please share them with me. My mail box is:

dean@deansys.com

New version packet generator binary and document will be available for anyone at my site: http://www.deansys.com.

And any of your ideas and suggestion would be welcome anytime! Please send them to me. My mailbox is dean@deansys.com. Thanks a lot!

8. THANKS

Thank for all the guys who share me with their ideas and suggestions.

Design different system solutions for different usages.