

从CLI和分段识别的ASR 5000系列ICMP数据包生成

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简介

本文描述show port命令报告的字节数和ping命令，当ping在聚合服务路由器(ASR)时5000系列平台的CLI被执行。它也展示分段的作用，当发送的数据包比在接口的已配置的最大传输单元(MTU)极大时。这是有好的背景信息，当您排除故障用户平面问题与ping甚至一般来说穿过机箱的数据包的时候。并且，与ping的实验在节点是一个巨大方式确认在本文解释的概念。

问题

当您指定互联网控制消息协议(ICMP)数据包的大小时，大小是指获得包裹到数据包的原始有效负载。它不包括ICMP报头(8个字节)或IP报头(20个字节)。并且知名之士是以太网报头(14个字节=目的地MAC (6) +源MAC (6) +以太网帧类型(2))，VLAN标记(4个字节)和落后的以太网帧检查顺序(FCS，4个字节)，以后哪些不将显示在Wireshark trace。

解决方案

当您查看从show port [npu的输出|[数据链接](#)]计数器命令，可以应用的算术在本例中显示。匹配颜色为了获取直接的了解。当允许将发送的ping，不用其他流量覆盖产生的输出，此练习在与一点的端口工作对没有流量。

有效负载大小：(也是此命令的默认)的**56**个字节

有效负载+ ICMP报头：**64**

有效负载+ ICMP报头+ IP报头：**84**

有效负载+ ICMP报头+ IP报头+以太网报头+ VLAN标记：**102**

有效负载(56) + ICMP报头(8) + IP报头(20) +以太网报头(14) + VLAN标记(4) + FCS (4)：**106**

```
context Ctx
interface 21/1 broadcast
```

```
ip address 10.193.82.118 255.255.255.0
ip mtu 1500
#exit
```

```
port ethernet 21/1
no shutdown
vlan 30
no shutdown
bind interface 21/1 Ctx
#exit
#exit
```

```
[Ctx]ASR5000> show ip arp
```

Flags codes:

I - Incomplete, R - Reachable, M - Permanent, S - Stale,
D - Delay, P - Probe, F - Failed

Address	Link Type	Link Address	Flags	Mask	Interface
10.193.82.1	ether	00:00:0C:07:AC:1E	R		21/1

```
[Ctx]ASR5000> show ip route
```

"*" indicates the Best or Used route. S indicates Stale.

Destination	Nexthop	Protocol	Prec	Cost	Interface
*0.0.0.0/0	10.193.82.1	static	1	0	21/1

```
[Ctx]ASR5000> clear port data counters 21/1
```

Saturday April 12 14:06:21 UTC 2014

```
[Ctx]ASR5000> clear port npu count 21/1
```

Saturday April 12 14:06:21 UTC 2014

```
[Ctx]ASR5000> ping 10.193.82.1 count 1 size 56
```

Saturday April 12 14:06:21 UTC 2014

PING 10.193.82.1 (10.193.82.1) 56(84) bytes of data.

64 bytes from 10.193.82.1: icmp_seq=1 ttl=255 time=0.957 ms

--- 10.193.82.1 ping statistics ---

1 packets transmitted, 1 received, 0% packet loss, time 0ms

rtt min/avg/max/mdev = 0.957/0.957/0.957/0.000 ms

Note that the datalink counters include the FCS bytes, while both datalink and npu counters include the ethernet frame and vlan tags.

```
[Ctx]ASR5000> show port datalink count 21/1
```

Saturday April 12 14:06:25 UTC 2014

Counters for port 21/1:

Line Card Gigabit Ethernet Port

Rx Counter	Data	Tx Counter	Data
RX Unicast frames	112	TX Unicast frames	1
RX Multicast frames	3	TX Multicast frames	0
RX Broadcast frames	9	TX Broadcast frames	0
RX Size 64 frames	0	TX Size 64 frames	0
RX Size 65 .. 127 fr	14	TX Size 65 .. 127 fr	1
RX Size 128 .. 255 fr	0	TX Size 128 .. 255 fr	0
RX Size 256 .. 511 fr	110	TX Size 256 .. 511 fr	0
RX Size 512 .. 1023 fr	0	TX Size 512 .. 1023 fr	0
RX Size 1024 .. 1518 fr	0	TX Size 1024 .. 1518 fr	0
RX Size > 1518 frames	0	TX Size > 1518 frames	0
RX Bytes OK	43966	TX Bytes OK	106

```

RX Bytes BAD          0 | TX Bytes BAD          0
RX SHORT OK          0 | TX PAUSE              0
RX SHORT CRC         0 | TX ERR                0
RX OVF              0 |
RX NORM CRC         0 |
RX LONG OK          0 |
RX LONG CRC         0 |
RX PAUSE            0 |
RX FALS CRS         0 |
RX SYM ERR          0 |
-----+-----

```

[Ctx]ASR5000> show port npu count 21/1

Saturday April 12 14:06:25 UTC 2014

Counters for port 21/1

Counter	Rx Frames	Rx Bytes	Tx Frames	Tx Bytes
Unicast	1	102	1	102
Multicast	3	202	0	0
Broadcast	8	512	0	0
IPv4 unicast	1	102	1	102
IPv4 non-unicast	1	66	0	0
IPv6 unicast	0	0	0	0
IPv6 non-unicast	0	0	0	0
Fragments received	0	0	n/a	n/a
Packets reassembled	0	0	n/a	n/a
Fragments to kernel	0	0	n/a	n/a
HW error	0	0	n/a	n/a
Port non-operational	0	0	0	0
SRC MAC is multicast	0	0	n/a	n/a
Unknown VLAN tag	0	0	n/a	n/a
Other protocols	2	136	n/a	n/a
Not IPv4	0	0	n/a	n/a
Bad IPv4 header	0	0	n/a	n/a
IPv4 MRU exceeded	0	0	n/a	n/a
TCP tiny fragment	0	0	0	0
No ACL match	0	0	0	0
Filtered by ACL	0	0	0	0
TTL expired	0	0	n/a	n/a
Flow lookup twice	0	0	n/a	n/a
Unknown IPv4 class	0	0	n/a	n/a
Too short: IP	0	0	n/a	n/a
Too short: ICMP	0	0	0	0
Too short: IGMP	0	0	0	0
Too short: TCP	0	0	0	0
Too short: UDP	0	0	0	0
Too short: IPIP	0	0	n/a	n/a
Too short: GRE	0	0	n/a	n/a
Too short: GRE key	0	0	n/a	n/a
Don't frag discards	n/a	n/a	0	0
Fragment packets	n/a	n/a	0	0
Fragment fragments	n/a	n/a	0	0
IPv4VlanMap dropped	0	0	n/a	n/a
IPSec NATT keep alive	0	0	n/a	n/a
MPLS Flow not found	0	0	n/a	n/a
MPLS unicast	0	0	0	0
Size < 17	0	0	0	0
Size 17 .. 64	8	512	0	0
Size 65 .. 127	4	304	1	102
Size 128 .. 255	0	0	0	0
Size 256 .. 511	0	0	0	0
Size 512 .. 1023	0	0	0	0
Size 1024 .. 2047	0	0	0	0
Size 2048 .. 4095	0	0	0	0

```
Size 4096 .. 4500          0          0          0          0
Size > 4500                0          0          0          0
```

IP 分段

IP数据包分段发生，当数据包的大小，包括IP报头，但是没有任何Layer2数据例如来源/目的地MAC、VLAN ID或者FSC，分成多个网段为了遵照接口的(默认1500)“ip mtu”设置。在本例中，MTU设置为默认容量1500，1472尝试的ICMP有效载荷大小发送大于那将被分段不会被分段(1472 + ICMP报头(8) + IP报头(20) = 1500)，但是的任何。当分段发生时，有在端口npu和数据链接计数器计数的两个信息包碎片，一个在每个适当大小的桶。使用500数据包充斥ping的完成，1000个片段发送;500大号的和500小型的。此示例在ASR 5500运行了(与在ASR 5000)的输出示例比较，但是在两平台类似运作。

```
[ECS]ASR500> show ip interface
Thursday July 16 00:31:39 UTC 2015
Intf Name: 5/29-ECS
Intf Type: Broadcast
Description:
VRF: None
IP State: UP (Bound to 5/29 vlan id 31, 802.1P prior 0, ifIndex 85786626)
IP Address: 10.213.137.105 Subnet Mask: 255.255.255.0
Bcast Address: 10.213.137.255 MTU: 1500
Resoln Type: ARP ARP timeout: 60 secs
L3 monitor LC-port switchover: Disabled
Number of Secondary Addresses: 0

port ethernet 5/29
no shutdown
vlan 31
no shutdown
bind interface 5/29-ECS ECS
#exit
#exit
```

首先，请设立计数器的一个基准。指定NPU计数器的VLAN ID (为了确认所有ping有被添附的VLAN ID)。

```
[ECS]ASR5500> clear port datalink counters 5/29
Friday July 17 23:53:46 UTC 2015
```

```
[ECS]ASR5500> show port datalink counters 5/29
```

```
Friday July 17 23:53:46 UTC 2015
rCounters for port 5/29:
Line Card 10 Gigabit Ethernet Port
```

Rx Counter	Data	Tx Counter	Data
RX Bytes	406	TX Bytes	0
RX Unicast frames	0	TX Unicast frames	0
RX Multicast frames	4	TX Multicast frames	0
RX Broadcast frames	1	TX Broadcast frames	0
RX Size 64 frames	0	TX Size 64 frames	0
RX Size 65 .. 127 fr	5	TX Size 65 .. 127 fr	0
RX Size 128 .. 255 fr	0	TX Size 128 .. 255 fr	0
RX Size 256 .. 511 fr	0	TX Size 256 .. 511 fr	0
RX Size 512 .. 1023 fr	0	TX Size 512 .. 1023 fr	0
RX Size 1024 .. 1518 fr	0	TX Size 1024 .. 1518 fr	0
RX Size 1519 .. 1522 fr	0	TX Size 1519 .. 1522 fr	0

```
[ECS]ASR5500> clear port npu counters 5/29 vlan 31
Friday July 17 23:53:47 UTC 2015
```

```
[ECS]ASR5500> show port npu counters 5/29 vlan 31
Friday July 17 23:53:47 UTC 2015
Counters for port 5/29 vlan id 31:
```

Counter	Rx Frames	Rx Bytes	Tx Frames	Tx Bytes
Unicast	0	0	0	0
Multicast	3	196	0	0
Broadcast	1	64	0	0
IPv4 unicast	0	0	0	0
IPv4 non-unicast	3	196	0	0
IPv6 unicast	0	0	0	0
IPv6 non-unicast	0	0	0	0
Fragments received	0	0	n/a	n/a
Packets reassembled	0	0	n/a	n/a
Fragments to kernel	0	0	n/a	n/a
HW error	0	0	n/a	n/a
Port non-operational	539	38520	0	0
SRC MAC is multicast	0	0	n/a	n/a
Unknown VLAN tag	0	0	n/a	n/a
Other protocols	2	128	n/a	n/a

ping include IP报头被派出未成碎片的大小**1500**字节。在数据链路层的总大小(因为离开端口)是：

$$1472 \text{ (有效负载)} + 8 \text{ (ICMP报头)} + 20 \text{ (IP报头)} + 14 \text{ (MAC源/目的)} + 4 \text{ (VLAN ID)} + 4 \text{ (FSC)} = 1522$$

```
[ECS]ASR5500> ping 10.213.137.1 size 1472 flood
Friday July 17 23:53:48 UTC 2015
PING 10.213.137.1 (10.213.137.1) 1472(1500) bytes of data.
```

```
--- 10.213.137.1 ping statistics ---
500 packets transmitted, 500 received, 0% packet loss, time 422ms
rtt min/avg/max/mdev = 0.405/0.800/0.994/0.143 ms, ipg/ewma 0.845/0.802 ms
```

```
[ECS]ASR5500> show port datalink counters 5/29
Friday July 17 23:53:54 UTC 2015
Counters for port 5/29:
```

Line Card 10 Gigabit Ethernet Port			
Rx Counter	Data	Tx Counter	Data
RX Bytes	771008	TX Bytes	765656
RX Unicast frames	536	TX Unicast frames	524
RX Multicast frames	45	TX Multicast frames	0
RX Broadcast frames	20	TX Broadcast frames	0
RX Size 64 frames	0	TX Size 64 frames	0
RX Size 65 .. 127 fr	75	TX Size 65 .. 127 fr	0
RX Size 128 .. 255 fr	24	TX Size 128 .. 255 fr	18
RX Size 256 .. 511 fr	2	TX Size 256 .. 511 fr	6
RX Size 512 .. 1023 fr	0	TX Size 512 .. 1023 fr	0
RX Size 1024 .. 1518 fr	0	TX Size 1024 .. 1518 fr	0
RX Size 1519 .. 1522 fr	500	TX Size 1519 .. 1522 fr	500
RX OverSize frames	0	TX OverSize frames	0
RX UnderSize frames	0	TX UnderSize frames	0
RX ExceedMaxSize frames	0		
RX Fragment frames	0	TX Fragment frames	0
RX Jabber frames	0	TX Jabber frames	0
RX Control frames	0	TX Control frames	0
RX Pause frames	0	TX Pause frames	0
RX FCS Error frames	0	TX FCS Error frames	0
RX Length Error frames	0	TX Length Error frames	0
RX Code Error frames	0		
RX ExMaxSize Err frames	0		

```

----- + -----
[ECS]ASR5500> show port npu counters 5/29 vlan 31
Friday July 17 23:53:54 UTC 2015
Counters for port 5/29 vlan id 31:
Counter                Rx Frames      Rx Bytes      Tx Frames      Tx Bytes
-----
Unicast                520             761900        520             762800
Multicast              38              2811          0                0
Broadcast             18              1408          0                0
IPv4 unicast          538             763308        520             762800
IPv4 non-unicast      30              2027          0                0
IPv6 unicast          0                0             0                0
IPv6 non-unicast      8               784           0                0
Fragments received    0                0             n/a             n/a
Packets reassembled   0                0             n/a             n/a
Fragments to kernel   0                0             n/a             n/a
HW error              0                0             n/a             n/a
Port non-operational  9482            681251        0                0
SRC MAC is multicast  0                0             n/a             n/a
Unknown VLAN tag      0                0             n/a             n/a
Other protocols        20              1280          n/a             n/a
Not IPv4              8               784           n/a             n/a
...
Size  0 .. 63           0                0             0                0
Size  64 .. 127        70              5193          0                0
Size 128 .. 255        24              3408          18              2580
Size 256 .. 511        0                0             6              1980
Size 512 .. 1023       0                0             0                0
Size 1024 .. 2047      500             759000        500             759000
Size 2048 .. 4095      0                0             0                0
Size 4096 .. 8191     0                0             0                0
Size >= 8192          0                0             0                0

```

在大小的一增加由一个字节导致分段(> 1500)，因此500数据包被发送作为两套500数据包。在本例中ping发生故障的注释。这比已配置的MTU很可能归结于的网络能处理大小极大，但是那不是此款焦点。

```

[ECS]ASR5500> ping 10.213.137.1 size 1473 flood
Friday July 17 23:53:55 UTC 2015
PING 10.213.137.1 (10.213.137.1) 1473(1501) bytes of data.
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....^C
--- 10.213.137.1 ping statistics ---
500 packets transmitted, 0 received, 100% packet loss, time 7124ms
, ipg/ewma 14.277/0.000 ms

```

```

[ECS]ASR5500> show port datalink counters 5/29
Friday July 17 23:54:05 UTC 2015
Counters for port 5/29:
Line Card 10 Gigabit Ethernet Port
Rx Counter Data | Tx Counter Data
----- + -----
RX Bytes 786615 | TX Bytes 1566628
RX Unicast frames 601 | TX Unicast frames 1567
RX Multicast frames 111 | TX Multicast frames 0
RX Broadcast frames 47 | TX Broadcast frames 0
RX Size 64 frames 0 | TX Size 64 frames 501
RX Size 65 .. 127 fr 190 | TX Size 65 .. 127 fr 2

```

```

RX Size 128 .. 255 fr 64 | TX Size 128 .. 255 fr 48
RX Size 256 .. 511 fr 5 | TX Size 256 .. 511 fr 16
RX Size 512 .. 1023 fr 0 | TX Size 512 .. 1023 fr 0
RX Size 1024 .. 1518 fr 0 | TX Size 1024 .. 1518 fr 0
RX Size 1519 .. 1522 fr 500 | TX Size 1519 .. 1522 fr 1000
RX ExceedMaxSize frames          0
RX Fragment frames               0 | TX Fragment frames          0
RX Jabber frames                 0 | TX Jabber frames          0
RX Control frames                0 | TX Control frames        0
RX Pause frames                  0 | TX Pause frames          0
RX FCS Error frames              0 | TX FCS Error frames      0
RX Length Error frames           0 | TX Length Error frames   0
RX Code Error frames             0
RX ExMaxSize Err frames          0
----- + -----

```

```
[ECS]ASR5500> show port npu counters 5/29 vlan 31
```

```
Friday July 17 23:54:06 UTC 2015
```

```
Counters for port 5/29 vlan id 31:
```

```
Counter Rx Frames Rx Bytes Tx Frames Tx Bytes
```

```

-----
Unicast 554 766984 1562 1549040
Multicast 94 6962 0 0
Broadcast 53 4294 0 0
IPv4 unicast 607 771278 1562 1549040
IPv4 non-unicast 73 4904 0 0
IPv6 unicast 0 0 0 0
IPv6 non-unicast 21 2058 0 0
Fragments received 0 0 n/a n/a
Packets reassembled 0 0 n/a n/a
Fragments to kernel 0 0 n/a n/a
HW error 0 0 n/a n/a
Port non-operational 25146 1805666 0 0
SRC MAC is multicast 0 0 n/a n/a
Unknown VLAN tag 0 0 n/a n/a
Other protocols 68 4742 n/a n/a
Not IPv4 21 2058 n/a n/a
...
Size 0 .. 63 0 0 501 19546
Size 64 .. 127 188 14154 2 140
Size 128 .. 255 60 8520 45 6450
Size 256 .. 511 0 0 15 4950
Size 512 .. 1023 0 0 0 0
Size 1024 .. 2047 500 759000 1000 1518000
Size 2048 .. 4095 0 0 0 0
Size 4096 .. 8191 0 0 0 0
Size >= 8192 0 0 0 0

```