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## Introduction

This document describes the behavioural difference between Aggregation Services Routers 1000 series (ASR1K) and Integrated Services Routers 4000 series (ISR4K) routers in accounting for input and output packets when a sub-interface is configured with encapsulation dot1q even though they run the same IOS-XE software.

Contributed by Venkat Ramasamy Kannan, Cisco TAC Engineer.

## Prerequisites

### Requirements

Cisco recommends that you have knowledge of ASR1K and ISR4K routers along with basic vlan and sub-interface tagging concepts.

### Components Used

This document is not restricted to specific software and hardware versions.

However, The information in the document is created using the below hardware.

- ASR 1006 running IOS-XE 3.13.3S
- ISR 4321 running IOS-XE 3.16.0C

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

### Configure

#### Default Behaviour - ASR 1006

Config

```
!  
interface GigabitEthernet0/0/1  
no ip address  
load-interval 30  
negotiation auto  
!  
interface GigabitEthernet0/0/1.1115  
encapsulation dot1q 1115 native  
ip address 192.168.2.1 255.255.255.0  
!
```

## Input and Output Counters

```
R-ASR1006-2#show vlans dot1q 1115  
Total statistics for 802.1Q VLAN 1115:  
4021 packets, 241260 bytes input <-- counter is very low (and frozen) 10 packets, 420 bytes  
output <-- counter is very low (and frozen) 0 oversubscription packet drops
```

However these counters seem to be wrong because this is the only sub-interface under the physical interface, and there is a huge mismatch in the values.

```
NR-ASR1002-2#sh int gigabitEthernet 0/0/1  
GigabitEthernet0/0/1 is up, line protocol is up  
<trunc>  
2429325386 packets input, 1438158021764 bytes, 0 no buffer  
2429263775 packets output, 1438124149520 bytes, 0 underruns  
<trunc>
```

## Default Behaviour - ISR4321

### Config

```
!  
interface GigabitEthernet0/0/1  
no ip address  
load-interval 30  
negotiation auto  
!  
interface GigabitEthernet0/0/1.3503  
encapsulation dot1q 1115 native  
ip address 57.211.249.6 255.255.255.252  
!
```

## Input and Output Counters

```
ISR4321-1#show vlans dot1q 3503  
Total statistics for 802.1Q VLAN 3503:  
141584463 packets, 101578951916 bytes input  
142482559 packets, 45106997466 bytes output
```

```
ISR4321-1#show int gig 0/1  
<trunc>  
141584583 packets input, 2794771512 bytes, 0 no buffer  
142609327 packets output, 2166121790 bytes, 0 underruns  
<trunc>  
ISR4321-1#
```

Values between physical interface gig0/1 and the subinterface gig0/1.3503 match.

## Reason for the Behavioural Difference

The reason for this behavioural difference between ASR1K and ISR4K even though they run the same IOS-XE is that, when **encap dot1q 10 native** is configured, the stats are grabbed from the

data-plane. However in ASR1K, the stats are grabbed from the Shared Port Adaptor (SPA) hardware and the SPA is not as intelligent as the data-plane processor, so it doesn't know how to count untagged packets against a specific vlan.

## Configuration/Workaround

In order to make the ASR1K work like the ISR4K, you should count the packets at the data-plane level like the ISR4k. The way to do that is to configure this on the ASR.

**Router(config)# hw-module subslot x/y ethernet vlan unlimited**

**Warning:** This command must be used with caution. Once this is enabled, the SPA stops doing the packet classification. So, if the router is already in an over-subscribed scenario, any packet (high or low priority, because the packets are not classified anymore) could be dropped

## Verify

Counters on the ASR after configuration is added

```
R-ASR1006-2#show int giga 0/1
<trunc>
2429657821 packets input, 1438159132874 bytes, 0 no buffer
2429643228 packets output, 1438125250620 bytes, 0 underruns
<trunc>
R-ASR1006-2# R-ASR1006-2#show vlans dot1q 1115
Total statistics for 802.1Q VLAN 1115:
2429657834 packets, 1438159133962 bytes input
2429643241 packets, 1438125251511 bytes output
```