



**BreezeAccess VL &
BreezeNET B**

Understanding Priority Functionality

**August 2004
DN0801**

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| Date: 10 August, 2004 | Document Name Understanding Priority Functionality | Doc# DN0801 |
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Technical Note

Packet Priority in BreezeACCESS VL & BreezeNET B Version 2.0

Scope

This technical note describes the priority setting and its implementation in BreezeACCESS VL and BreezeNET B version 2.0. The document explains the two priority methods (802.1Q & IP ToS), describes the process in which the “respecting” of a packet is achieved, and explains how the priority setting of a packet is implemented in the BreezeACCESS VL & BreezeNET B version 2.0.

Introduction

BreezeACCESS VL & BreezeNET B is priority aware to both the user_priority field in tagged Ethernet frames according to 802.1Q, and the precedence bits of the IP header according to RFC 791. The system both sets the priority of a frame (when an SU/RB is in Access mode or when generating management frames), and prioritizes the transmission of the frame according to the priority setting in the Ethernet frame.

The newer IP priority standard named Diffserv is also partly supported by the system as it supports the IP ToS. The system ignores the 3 LSB in the DSCP field.

802.1Q & IP ToS

BreezeACCESS VL & BreezeNET B complies with two priority-setting standards:

- 802.1Q (user_priority)
- RFC791 (Type of Service)

802.1Q

The IEEE 802.1Q is a standard that handles Virtual Bridged Local Area Networks. According to this standard a tagged Ethernet frame will be added a 802.1Q header. This header holds three main fields:

1. VLAN ID. A 12 bit long identifier that specifies to which VLAN group this frame belongs.
2. CFI: The Canonical Format Indicator (CFI) is a single bit flag value. CFI reset indicates that all MAC Address information that may be present in the MAC data carried by the frame is in a Canonical format.
3. user_priority: "The user_priority field is three bits long, interpreted as a binary number. The user_priority is therefore capable of representing eight priority levels, 0 through 7. The use and interpretation of this field is defined in "IEEE Std 802.1D, 1998 Edition."

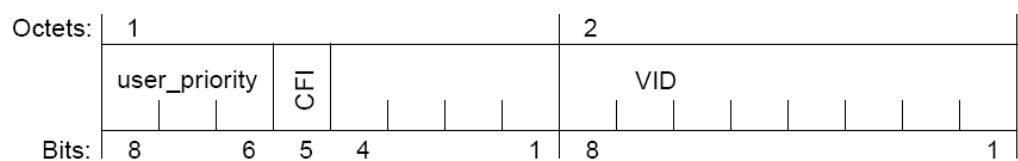


Figure 1: 802.1Q header

IEEE 802.1D defines:

“...Values 1 through 7 form an ordered sequence of user_priorities, with 1 being the lowest value and 7 the highest.”

BreezeACCESS VL & BreezeNET B Interpretation

The priority threshold setting in BreezeACCESS VL & BreezeNET B under Bridging-VLAN is a number between 0 and 7. A frame arriving with a higher number in the user_priority field is classified as a high priority packet. A frame arriving with a value between 0 and 7, or with a lower value in the user_priority field is classified as a low priority frame.

IP ToS

According to RFC 791, an IP frame header shall include a field that specifies the type of service: “...The parameters in the field are used to guide the selection of the actual service parameters when transmitting a datagram through a particular network. Figure 1 specifies the bits in the IP ToS field...”

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------|---|---|---|---|---|---|---|
| Precedence | | | D | T | R | 0 | 0 |

Bits 0-2: Precedence.

Bit 3: 0 = Normal Delay, 1 = Low Delay.

Bits 4: 0 = Normal Throughput, 1 = High Throughput.

Bits 5: 0 = Normal Reliability, 1 = High Reliability.

Bit 6-7: Reserved for Future Use.

Precedence

111 - Network Control

110 - Internetwork Control

101 - CRITIC/ECP

100 - Flash Override

011 - Flash

010 - Immediate

001 - Priority

000 - Routine

Figure 2: Type of Service field in the IP header according to RFC 791

BreezeACCESS VL & BreezeNET B Interpretation

The ToS precedence threshold in BreezeACCESS VL & BreezeNET B parameter may hold values from 0 to 7. These values are the values of the 3-bit long precedence field. BreezeACCESS VL & BreezeNET B disregards the other bits in the ToS header.

Prioritizing Packets

BreezeACCESS VL & BreezeNET B version 2.0 incorporates three different wireless queues: low, medium and high. These queues hold packets prior to their transmission over the air. The packets in the high queue will be transmitted first. When this queue is emptied, the packets in the medium queue are sent, and finally the packets in the low queue are sent.

Two different priority thresholds appear in BreezeACCESS VL & BreezeNET B units:

1. IP ToS priority threshold
2. VLAN priority threshold.

If a packet's priority is higher than the threshold, then the system considers this packet a high priority packet.

The packets are directed to the unit's wireless queues according to the following rules:

1. High queue: a frame that is identified as a high priority frame by either the IP ToS or the user_priority field in the VLAN header.
2. Medium queue: MAC broadcast frame.
3. Low queue: a frame that is identified as a low priority frame by both the IP ToS header and the VLAN header.

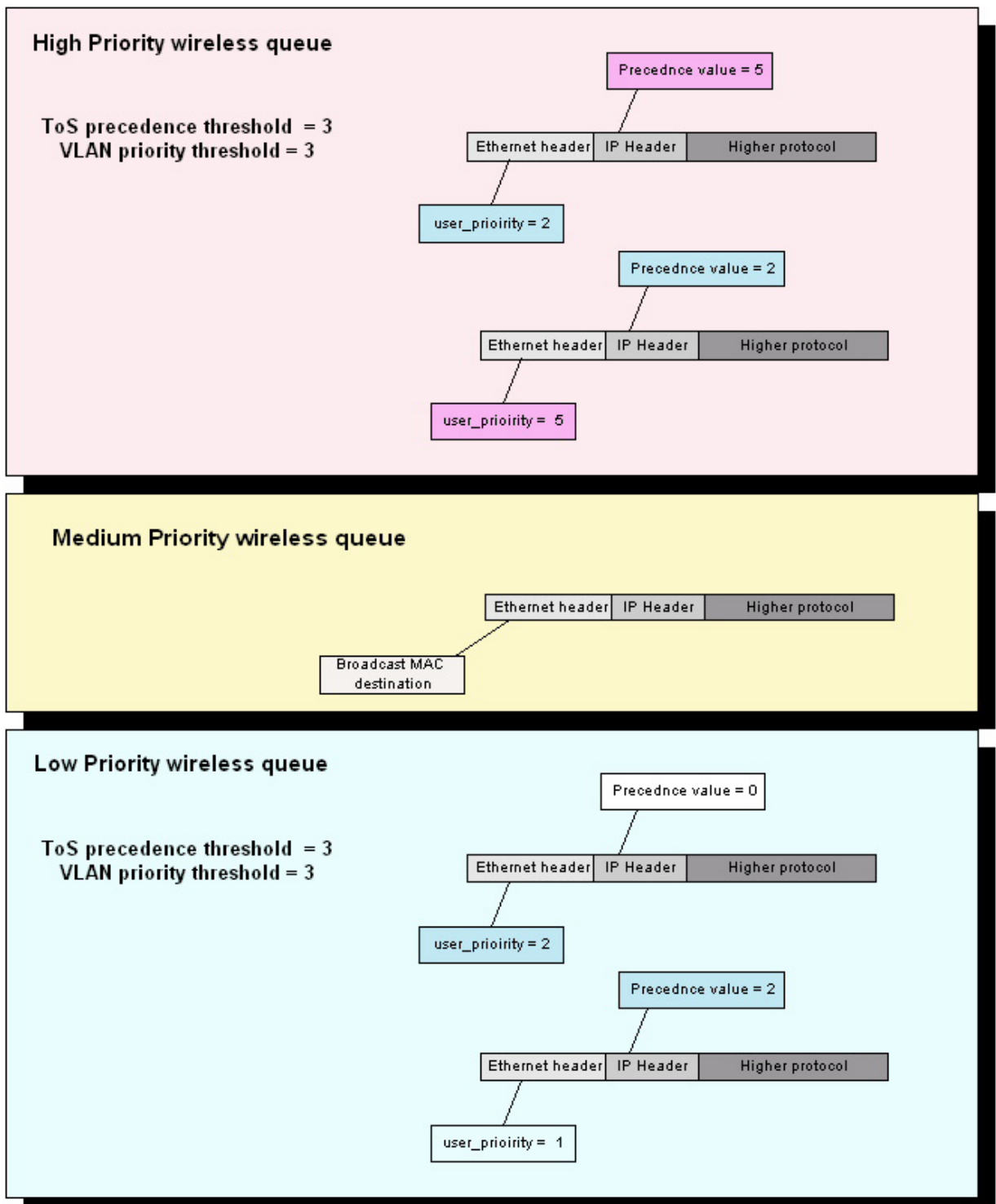


Figure 3: Frame Distribution in Wireless Queues

Priority Setting

The BreezeACCESS VL & BreezeNET B sets the priority of a frame only in the following cases:

- When a unit is defined with a Management VLAN other than 65535, it sends out frames with the defined Management VLAN as the VLAN ID, and the Management priority is set in the user_priority field of the tagged frame.
- When the unit is set to Access mode (SU or RB). In this mode, the system accepts only untagged VLAN frames on the Ethernet side, tags them with a VLAN header according to the VLAN data tag and Data priority configured by the user. In this case the SU/RB will set the packet in one of its queues according to the IP ToS header and not according to the “newly” set VLAN priority.

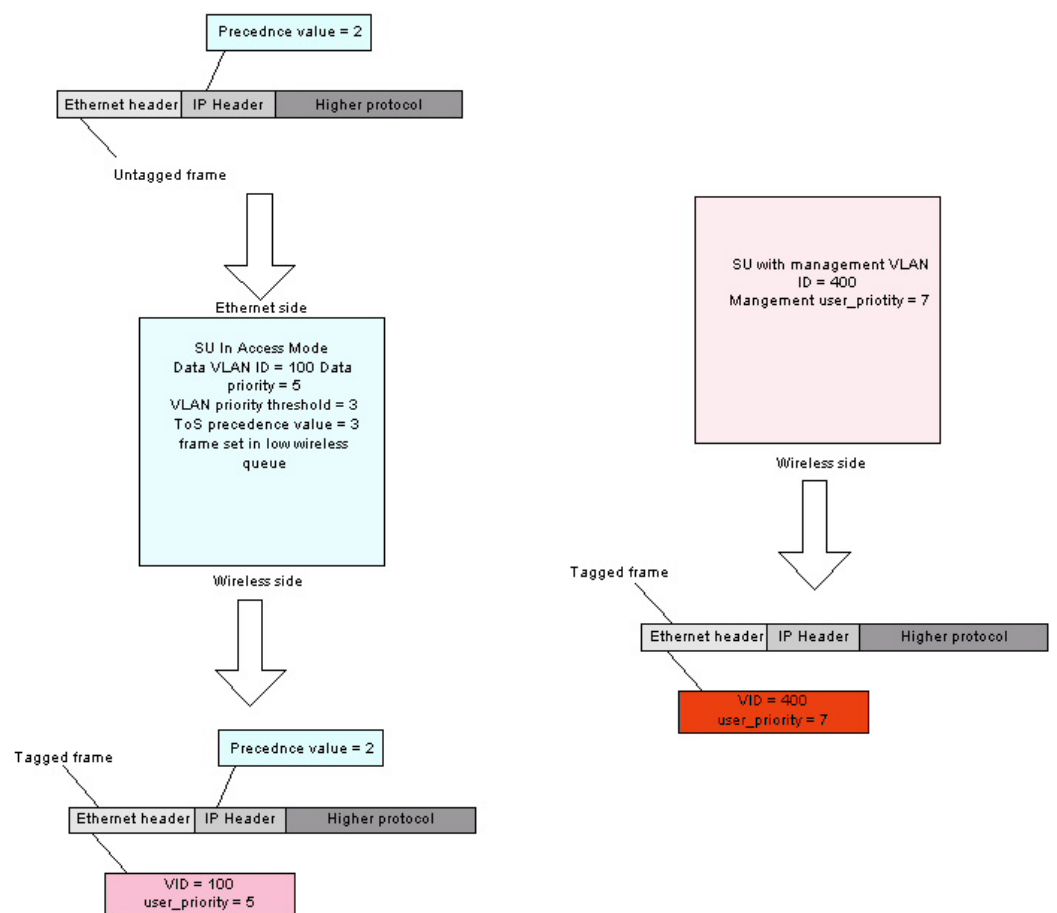


Figure 4: user_priority Setting