IEEE 802.1D

Expedited Traffic Capabilities

Traffic Types in a Typical LAN Environment (1)

- **Network control**
  - characterized by a 'must get there' requirement to maintain and support the network infrastructure
- **Voice**
  - characterized by less than 10 millisecond delay, and hence maximum jitter (one way transmission through the LAN infrastructure of a single campus)
- **Video**
  - characterized by less than 100 millisecond delay
- **Controlled Load**
  - important business applications subject to some form of 'admission control', be that pre-planning of the network requirement at one extreme to bandwidth reservation per flow at the time the flow is started at the other extreme
- **Excellent Effort -or CEO best effort**
  - best effort type services that an information services organization would deliver to its most important customers

Traffic Types
in a Typical LAN Environment (2)

- **Best Effort**
  - LAN traffic as we know today
- **Background**
  - bulk transfers and other activities which are permitted on the network but which should not impact the use of the network by other applications

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Traffic Type to User-priority Mapping

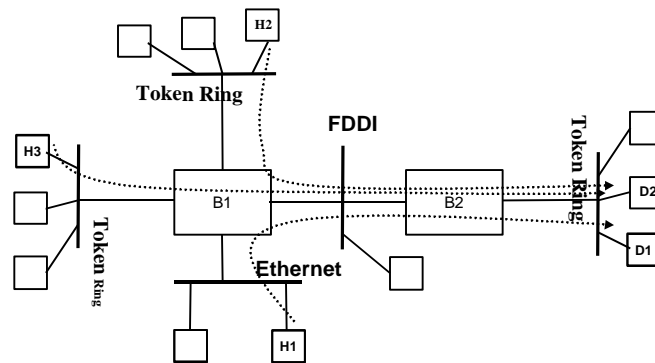| User_priority	Acronym	Traffic Type
1	BK	Background
2	-	Spare
0 (default)	BE	Best Effort
3	EE	Excellent Effort
4	CL	Controlled Load
5	VI	Video
6	VO	Voice
7	NC	Network Control

User Priority Regeneration (1)

- Not all MAC layer frame formats include priority field in their headers
  - e.g., IEEE802.5 Token Ring defines 8 priority levels
  - e.g., Ethernet, IEEE802.3 do not include a priority field

- For maximum flexibility, user priority for frames received on a given port may be regenerated according to information that is preset by management procedures.

User Priority Regeneration (2)

User Priority	Default Regenerated User Priority	Range
0	0	0-7
1	1	0-7
2	2	0-7
3	3	0-7
4	4	0-7
5	5	0-7
6	6	0-7
7	7	0-7

- User priority value for a frame received on a port may be either the value received in the frame itself (the default value) or mapped to some value in the range 0-7 (preset for that port).
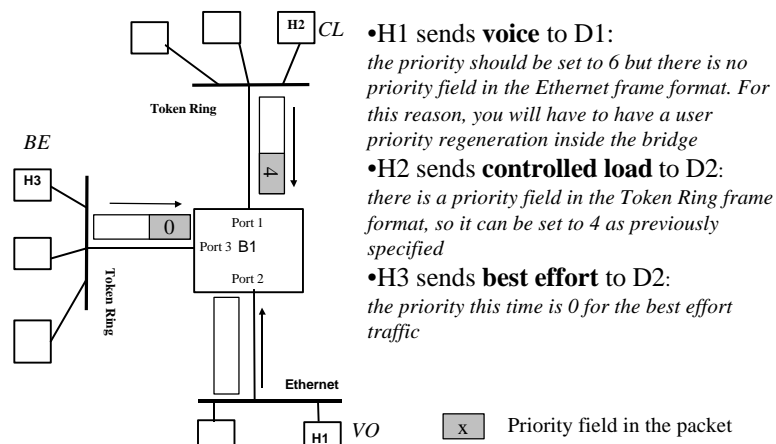
Example

H1 sends **voice** to D1
H2 sends **controlled load** to D2
H3 sends **best effort** to D2

Example
Traffic Type to User Priority mapping

•H1 sends **voice** to D1:
the priority should be set to 6 but there is no priority field in the Ethernet frame format. For this reason, you will have to have a user priority regeneration inside the bridge

•H2 sends **controlled load** to D2:
there is a priority field in the Token Ring frame format, so it can be set to 4 as previously specified

•H3 sends **best effort** to D2:
the priority this time is 0 for the best effort traffic

| x | Priority field in the packet |

User Priority to Traffic Class Mapping (1)
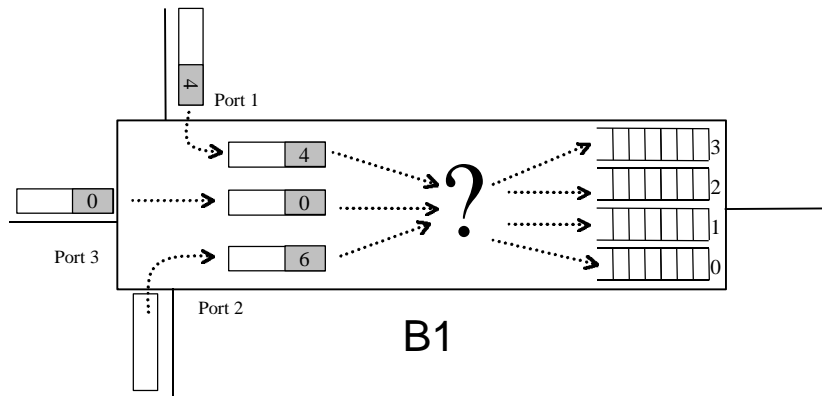
User Priority to Traffic Class Mapping (2)

- For a given bridge, there may be more than one traffic class specified, and thus one transmission queue for each traffic class

- Frames are assigned to the transmission queues on the basis of their user priority, using the traffic class table that is part of the *state information* associated with that port.
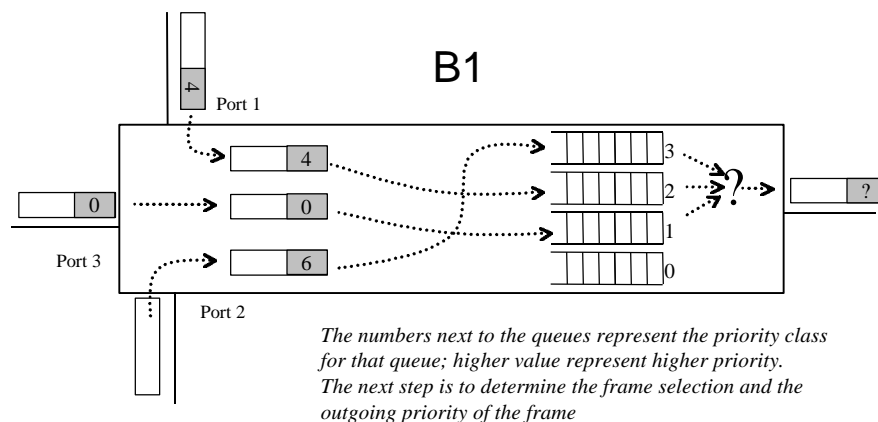
Recommended
Traffic Type to Traffic Class Mapping

Number of Queues	Defining Traffic Type						
1	BE						
2	BE			VO			
3	BE			CL		VO	
4	BK		BE	CL		VO	
5	BK		BE	CL	VI	VO	
6	BK	BE	EE	CL	VI	VO	
7	BK	BE	EE	CL	VI	VO	NC
8	BK	-	BE	EE	CL	VI	VO	NC

Recommended
User Priority to Traffic Class Mapping

		Number of Available Traffic Classes							
		1	2	3	4	5	6	7	8
	0 (Default)	0	0	0	1	1	1	1	2
	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	1
User Priority	3	0	0	0	1	1	2	2	3
	4	0	1	1	2	2	3	3	4
	5	0	1	1	2	3	4	4	5
	6	0	1	2	3	4	5	5	6
	7	0	1	2	3	4	5	6	7

Example

User Priority to Traffic Class Mapping

B1

*The numbers next to the queues represent the priority class
for that queue; higher value represent higher priority.
The next step is to determine the frame selection and the
outgoing priority of the frame*

Selection of Frames for Transmission

- According to IEEE802.1p, selection of frames for
  transmission is based on highest priority first
  - i.e. , frames are selected from a given transmission queue only if
    all queues corresponding to numerically higher values of traffic
    supported by the port are empty at the time of selection

- Other algorithms selectable by management may also
  be supported as an implementation option

Outbound Access Priorities

User priority	Outbound Access Priority per media access control method							
	8802-3	8802-4	8802-5 (default)	8802-5 (alternate)	8802-6	802.9a	8802-12	FDDI
0	0	0	0	4	0	0	0	2
1	0	1	1	4	1	0	0	0
2	0	2	2	4	2	0	0	1
3	0	3	3	4	3	0	0	3
4	0	4	4	4	4	0	4	4
5	0	5	5	5	5	0	4	5
6	0	6	6	5	6	0	4	6
7	0	7	6	6	7	0	4	6

Example
Frame Selection and Outbound Priority Mapping

Non empty Buffer

Empty Buffer
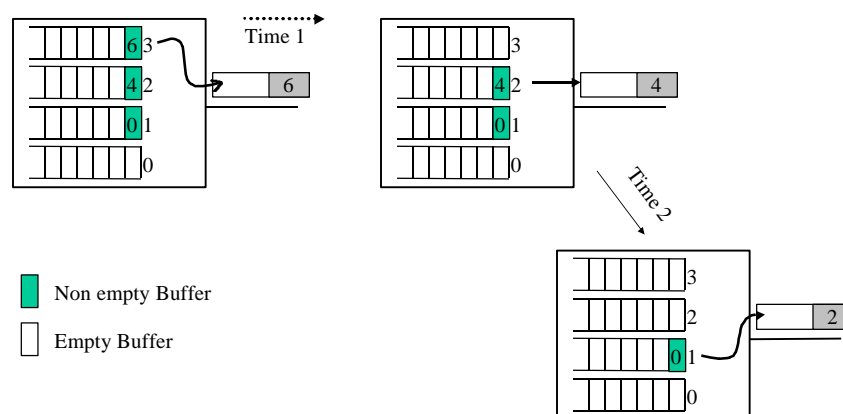
Conclusion

- Expedited traffic capabilities
  - Allow the transmission of time-critical data to be expedited (to achieve low latency) even when it is in competition for network bandwidth with other non-time-critical data
  - Not intended to provide guaranteed quality of service